

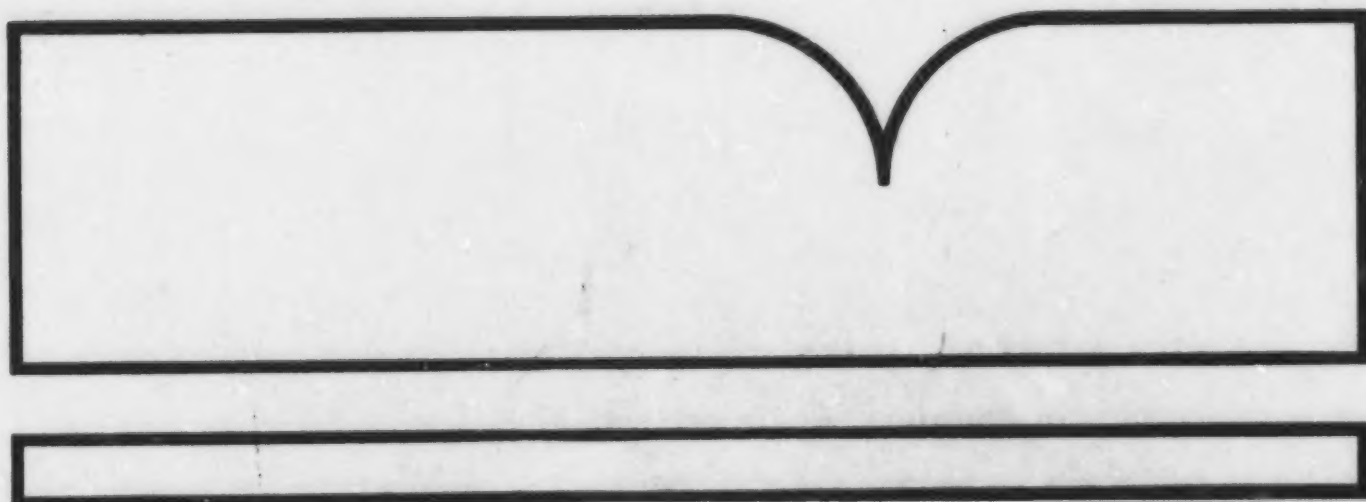
CSDOC (County Sanitation Districts of Orange
County) Wastewater Management Program
Environmental Impact Statement (Draft)

Orange County Sanitation Districts
Fountain Valley, CA

Prepared for

Environmental Protection Agency
San Francisco, CA

Mar 77



U.S. Department of Commerce
National Technical Information Service

NTIS.

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CSDOC Wastewater Management Program Environmental Impact Statement

**March 1977 Draft
Summary**



**County Sanitation Districts
of Orange County**



U.S. Environmental Protection Agency



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IX
100 CALIFORNIA STREET
SAN FRANCISCO, CALIFORNIA 94111

APR. 27 1977

To All Interested Agencies, Public Groups, and Concerned
Individuals:

The Draft Environmental Impact Statement/Environmental Impact Report for the County Sanitation Districts of Orange County Wastewater Management Program is submitted for your review and comment. This statement has been prepared in compliance with the National Environmental Policy Act of 1969 (P.L. 91-190), and implementing regulations promulgated by the Council on Environmental Quality and the Environmental Protection Agency. It has also been prepared in compliance with the California Environmental Quality Act and its implementing regulations.

Comments should be sent to this Office within forty-five (45) days of the date of this letter. All comments received will be considered in the preparation of the final Environmental Impact Statement for this action. In order to receive public comment, the Environmental Protection Agency, Region IX, and the County Sanitation Districts of Orange County will hold public hearings on the Draft EIS during June, 1977. The times and places for these hearings will be provided at a later date. All interested parties are invited to express their views at the hearings. Persons wishing to make comments may submit same in writing and/or appear at the hearings. Oral statements will be considered, but, for the accuracy of the record, all important testimony should be submitted in triplicate to:

Environmental Protection Agency
Attn: Hearings Office
Region IX
100 California Street
San Francisco CA 94111

Enough copies of the written material should be provided so that the other interested parties at the hearing may receive a copy. Oral statements should summarize extensive written material since there will be time for all interested parties to be heard. The Draft EIS and supplemental information, including the Facilities Plan may be reviewed at:

County Sanitation Districts of Orange County
10844 Ellis Avenue
Fountain Valley CA 92708

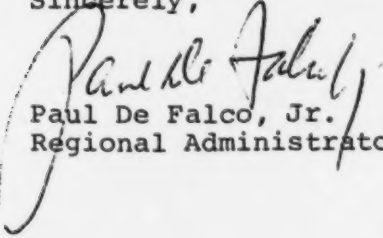
EPA, Region IX Library
100 California Street
San Francisco CA 94111

Freedom of Information Center
EPA, Room 329
401 M. Street
Washington D.C. 20460

These documents will also be available at all local public libraries within the service area of the County Sanitation Districts of Orange County.

Please bring this notice to the attention of all persons who would be interested in this matter.

Sincerely,



Paul De Falco, Jr.
Regional Administrator

PREFACE

This is a summary of the Environmental Impact Statement and Report (EIS/EIR) for the CSDOC Wastewater Management Program. This summary has been prepared by the U.S. Environmental Protection Agency, Region IX. [The EIS/EIR summary and full report present the environmental, economic, and social effects of wastewater facility planning decisions which will affect over 1.5 million persons living in northeastern Orange County, and involve capital costs of \$400 to \$500 million over the next 10 to 20 years.]

The two main purposes of this document are:

- . To publicize and solicit comment on the long-range environmental and social effects of wastewater management decisions which must be made by CSDOC and regulatory and funding agencies.
- . To provide a comparison of planning alternatives so that citizens can comment and express concerns and preferences they may have.

The Draft EIS/EIR is being distributed in advance of public hearings scheduled for June, 1977. Public comments are expected to play a key role in (1) selection of a long-range wastewater facility plan for the CSDOC service area including size and type of collection and treatment facilities and (2) implementation of measures needed to reduce environmental effects.

Following the public hearings in June, the Draft EIS/EIR will be revised in light of public comments to form the Final EIS/EIR. All public response and planning decisions reached on the basis of that response will be included in the Final EIS/EIR.

If you do not comment at the public hearings, you may send written comments to EPA at the address shown below up to at least 30 days following the hearings.

Copies of the Draft or Final EIS/EIR can be obtained by a written or telephone request to the addresses given below.

County Sanitation Districts of Orange County
Post Office Box 8127
Fountain Valley, California 92708

Attention: Ray Lewis, Chief Engineer or
Hillary Eitzen, Administrative Coordinator
(714) 540-2910 or (714) 962-2411

United States Environmental Protection Agency
Pacific Southwest, Region IX
100 California Street
San Francisco, California 94111

Attention: Fred Krieger (415) 556-7554 or
Richard Williamson (415) 556-2833

The EPA and Districts thank you for the interest you have shown
and solicit your comments on the proposed wastewater management
program.

INTRODUCTION

This is a summary of the Draft Environmental Impact Statement (EIS) for sewage treatment facilities planned by the County Sanitation Districts of Orange County (CSDOC).

The CSDOC planning program is part of a nationwide effort being jointly undertaken by Federal, State, and local agencies to satisfy the requirements of State and Federal water pollution control laws. The combined efforts of local Southern California agencies to comply with Federal and State laws shown on Figure 1, could result in costs in excess of \$1 billion. This money will be used to provide secondary treatment, sludge disposal, and wastewater reclamation as well as allow capacity for future growth.

The Federal law requiring upgraded treatment for CSDOC wastewaters is the Water Pollution Control Amendments of 1972 (Public Law 92-500). Under this law, Federal grants are available to finance up to 75 percent of the costs of new wastewater facilities. In California, the state government finances an additional 12 1/2 percent of facility costs. The remaining 12 1/2 percent is paid for by local agencies. The costs of operation and maintenance will have the greatest effect on local users since they are entirely a local responsibility and these will continue for the life of the facilities.

In California, the Federal municipal wastewater construction grant program is administered by the California State Water Resources Control Board. EPA is more directly involved with the CSDOC wastewater program than in other wastewater programs because of EPA's decision to prepare an EIS on the District's program.

PROBLEM DESCRIPTION

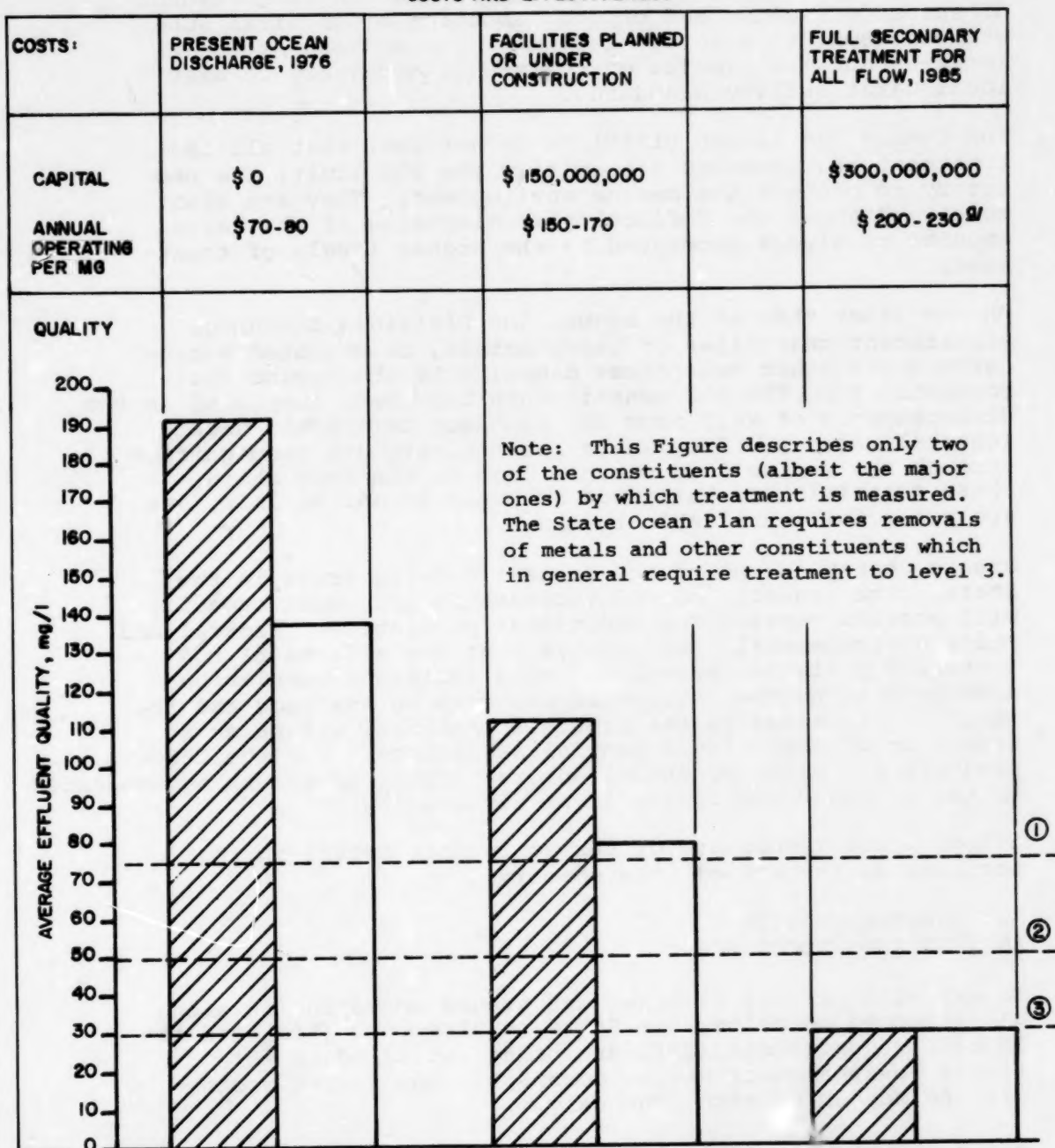
There are two wastewater problems facing the CSDOC. First, their present effluent does not meet the present State and Federal discharge limitations (figure 2) for protection of the marine environment. Second, the service area is growing both in size and population; and the present capacity of the facilities may soon be exceeded.

The Districts' present ocean discharge limitations consist of a combination of State and Federal requirements which are contained in a National Pollution Discharge Elimination System (NPDES) permit, issued June 7, 1974 (see Table 5). State of California regulations for ocean discharges require stringent control of many potentially toxic pollutants. The



**FIGURE 2
PRESENT AND FUTURE WASTEWATER TREATMENT
COSTS AND EFFECTIVENESS**

3



- ① STATE SUSPENDED SOLIDS STANDARDS NOT TO BE EXCEEDED 10% OF THE TIME
- ② STATE STANDARD NOT TO BE EXCEEDED 50% OF THE TIME
- ③ FEDERAL SECONDARY TREATMENT CRITERIA-30 DAY AVERAGE FOR BOD & SS

BIOCHEMICAL OXYGEN DEMAND

SUSPENDED SOLIDS

^{g/} Include ultimate sludge disposal

Federal requirements mandate a uniform nation-wide removal of suspended solids and oxygen demanding biochemical substances (BOD) to a level of 30 mg/l, regardless of the location and the removal of pollutants necessary to meet local water quality standards.

The County Sanitation Districts do not feel that all the treatment requirements (especially the BOD limit) are necessary to protect the marine environment. They are also concerned about the difficulty in disposing of the large amounts of sludge generated by the higher levels of treatment.

On the other side of the issue, the Districts discharge significant quantities of heavy metals, chlorinated hydrocarbons and other substances damaging to the marine environment. Even the BOD constituents have been suspected in the disappearance of kelp from the Southern California Bight (coastal waters). Some waste constituents are biomagnified through the marine food chain. Once in the food chain, these materials are hazardous not only to marine life, but are potentially available to man.

Orange County is one of the fastest growing areas in the State. The urgently needed increase in treatment capacity will provide service for additional population. Federal and State environmental laws require that the effects of the increased pollution associated with increased population accommodated by the wastewater projects be analyzed and the impact minimized to the greatest practical extent as a condition of obtaining financial assistance. For the CSDOC project, the major potential adverse impact of growth accommodated by the proposed facilities is on air quality.

All of these issues are discussed in more detail in the sections at the end of this summary.

GOVERNMENTAL REVIEW AND FUNDING PROCEDURES

To expedite project planning and assure coordination among all affected agencies, the State requirements (EIR) and the Federal requirements (EIS) are being satisfied in this single environmental review document. The review process will be scheduled simultaneously.

State and Federal grant funding for the improvement of wastewater facilities are provided in three parts including:

- Step 1 which provides for the preparation of the

facilities plan including engineering, feasibility analysis, and revenue program; environmental impact statement and/or report; and other studies as are necessary to select facilities and analyze impacts.

- Step 2 which includes preparation of design, technical studies and plans and specifications for construction.
- Step 3 which results in construction of the facilities.

The key decision on proceeding with the project occurs at the conclusion of Step 1 when the facilities plan is evaluated by the State, which administers Federal and State grant funds in California. The Draft EIS and the public response is evaluated by EPA. If the planning is complete and the environmental issues resolved, approval is given to proceed to Step 2.

AGENCY AND PUBLIC PARTICIPATION

Throughout the EIS process, the Districts and EPA have solicited the views and drawn upon the expertise of many Federal, State, and local agencies as required by the National Environmental Policy Act and the California Environmental Quality Act. In addition, the views of interested citizens were solicited in a series of five public workshops and three town meetings.

By commenting on this document or by testifying at the public hearing in June, individuals can help resolve the critical issues affecting construction of the proposed wastewater facilities. Comments are particularly solicited on:

- How critical is the need to protect the marine environment - How much should we spend?
- The proposed capacity of the facilities - How much growth do we build for?
- Reclamation policies and proposals - How quickly do we pursue these?
- Measures to mitigate impacts of the proposed projects, especially the secondary impacts on air quality - How much inconvenience is acceptable to prevent deterioration of the environment from the secondary impacts of population growth?

EXISTING SOURCES AND DISPOSITION OF WASTEWATERS

There are a large number of sources which contribute materials to the marine environment. Mass emissions rates for various

substances which enter the offshore waters of Southern California from major sources are shown in Table 1.

Municipal wastewater discharges are significant contributors of nutrients, toxicants, and other pollutants. Mass emission rates (1974) for the five largest municipal waste dischargers are summarized in Table 2.

The CSDOC disposes of its sewage solids through composting and sale as a soil amendment. Other agencies use this technique or dispose of the sewage solids at Sanitary landfills. Generally, when compared to chemical fertilizers, the nutrient value of sewage solids is quite low. Nevertheless, its bulking and soil conditioning properties are good.

The CSDOC, the City and County of Los Angeles, EPA, and the State Water Resources Control Board have joined together to conduct a regional sludge management planning program. The alternatives being considered include a joint disposal and reclamation program for conveyance of solids to desert areas for reclamation of land for use in crop production, incineration to generate electrical energy, local processing and disposal, and the required "no project" or status quo alternatives.

EXISTING DISTRICT FACILITIES AND THEIR OPERATION

The Districts now collect and treat about 180 million gallons per day (mgd) of municipal and industrial wastewaters generated by 1.5 million persons living within a 300 square-mile urbanized area of northeastern Orange County. Existing facilities include some 500 miles of major interceptor sewers, 30 pump stations, and two large regional treatment plants which serve 23 cities and other unincorporated county areas.

All flows now receive a minimum of primary treatment consisting of screening and sedimentation which removes about 30 to 50 percent of the organics and 50 to 60 percent of the sewage solids plus floatable substances. Such treatment removes few bacteria and toxic substances. 20 mgd of the present flows now receive secondary treatment, of which 15 mgd is used for reclamation.

Treatment Plant No. 1, with a capacity for treating 46+ million gallons per day (MGD) is located adjacent to the Santa Ana River just south of the San Diego Freeway in Fountain Valley. The plant provides primary treatment for all wastewater flow up to its capacity and secondary treatment for up to 20 mgd. A new 46 mgd activated sludge secondary treatment plant which will greatly improve effluent quality

TABLE I

ESTIMATED MASS EMISSION RATES INTO THE
SOUTHERN CALIFORNIA BIGHT FROM VARIOUS SOURCES, 1974
(tons/year)

Constituent	Discrete Sources			Diffuse Sources		
	Municipal Wastewaters	Surface Runoff	Industrial Waste	Ocean Vessels	Ocean Dumping	Aerial Fallout
Major Wastewater Constituents						
Total suspended solids	305,800	--	17,600	--	--	--
Volatile suspended solids	196,900	--	--	--	--	--
5-day bio. oxygen demand	320,100	--	6,600	--	--	--
Chemical oxygen demand	742,500	31,900	85,800	--	--	--
Oil and grease	71,500	4,840	2,420	--	--	--
Dissolved silica (SiO ₂)	36,300	3,080	--	--	--	--
Nutrient Substances						
Nitrate nitrogen	583	1,078	--	--	--	--
Ammonia nitrogen	65,340	484	10,450	--	--	--
Organic nitrogen	27,280	1,200	--	--	--	--
Total nitrogen	93,940	2,760	11,000	--	--	--
Phosphate phosphorous	14,630	450	--	--	--	--
Toxicants						
Detergent (MBAS)	8,360	72	--	--	--	--
Cyanide (CN)	231	12	--	--	--	--
Phenols	1,903	296	47	--	--	--
Metals						
Silver	16	1.2	--	--	1.6	--
Arsenic	--	--	--	2	--	--
Cadmium	59	1.3	--	0.1	15	--
Cobalt	3.3	5.8	--	--	15	--
Chromium	714	28	--	1.1	30	--
Copper	623	20	--	424	30	440
Mercury	3.2	0.07	--	4.3	1.6	9
Nickel	344	18	--	--	30	44
Lead	232	99	--	10	30	3,740
Zinc	1,848	111	--	180	62	2,420
Iron	6,600	28,600	--	--	308	44
Manganese	112	201	--	--	30	538
Chlorinated Hydrocarbons						
Total DDT	21	.13	--	--	15	2.2
Total PCB	10	.27	--	4.5	38	3.2
Silt	--	301,400	--	--	--	--

SOURCE: SCCWRP

TABLE 2

MASS EMISSION RATES FROM
MUNICIPAL WASTE DISCHARGERS, 1974

Flow (mgd)	Los Angeles County ¹	Los Angeles City ²		Orange County ³	San Diego	Oxnard ⁵
		5-Mile Outfall	7-Mile Outfall			
Flow (mgd)	346	341	4.72	171	104	10.1
General Constituents (tons/yr)						
Total Suspended Solids	145,200	43,000	52,300	27,700	22,000	2,600
Volatile Suspended Solids	95,600	34,200	33,700	19,500	17,000	--
5-day BOD	112,200	62,600	13,700	39,000	30,000	3,900
Chemical Oxygen Demand	322,200	129,800	55,200	6,700	--	--
Oil and Grease	29,000	9,300	6,400	9,000	6,500	600
Nitrate Nitrogen	79	155	--	76	--	--
Ammonia Nitrogen	20,240	7,100	2,150	9,000	4,200	--
Organic Nitrogen	8,250	3,300	1,800	1,040	--	--
Total Nitrogen	28,600	10,500	3,400	10,400	5,600	--
Total Phosphate	25,000	12,500	4,800	7,160	--	--
Detergent (MBAS)	3,600	2,600	--	1,740	1,300	20
Cyanide (CN)	225	104	3.8	33.8	--	0.08
Phenols	1,738	31	--	112	36	2.5
Trace Metals (tons/yr)						
Silver	5.91	10	2.9	3.1	1.3	0.12
Arsenic	12.4	5	1.3	0.62	<4.1	0.02
Cadmium	21.6	10	9.1	15.9	4.1	0.19
Chromium	452	109	108	73	17	0.31
Copper	315	98	117	104	16	1.13
Iron	4,290	331	564	312	1,000	15.3
Mercury	0.58	1.7	1.0	<.03	0.08	--
Manganese	57.75	10.4	1.4	23.4	63	1.53
Nickel	163	93	22	60	7.8	--
Lead	136	21	8	44	9.3	2.0
Selenium	6.3	104	2.9	0.52	--	0.22
Zinc	941	124	172	140	79	4.3
Chlorinated Hydrocarbons (lbs/yr)						
Total DDT	3,168	746	37.2	177	733	<7.66
Total PCB	11,352 ⁷	372	47.3	8,888	--	--
Dieldrin	10.5	10.4	2.44	8.9	--	<3.06

SOURCE: SCCWPP 1975.

¹JWPCF, Los Angeles County Sanitation Districts.²City of Los Angeles, Bureau of Sanitation.³County Sanitation Districts of Orange County.⁴City of San Diego.⁵City of Oxnard.⁶Estimated, no data available.⁷Two-thirds of this amount (7,634 lbs) was discharged during the 3-month period October-December.

and provide for meeting potential demands for reclaimed wastewater is nearly completed (start-up June 1977).

Treatment Plant No. 2, with a primary treatment capacity of 138 mgd, is located in the City of Huntington Beach adjacent to the mouth of the Santa Ana River. Oxygen-activated sludge secondary treatment facilities are being designed for 75 mgd and are expected to be operating by 1980.

Treated flows from the two plants are blended at Treatment Plant No. 2 and pumped through the Districts' five-mile ocean outfall for ocean disposal at a depth of 200 feet. Wastewaters are eventually mixed and diluted with seawater in a 6,000 foot diffuser approximately 5 miles at sea. The initial dilution for average ocean conditions will generally be 200 parts of ocean water to 1 part of treated waste water, but even with unfavorable ocean conditions, the initial dilution will be at least a ratio of 100:1. This projected dilution may be reduced during periods with the ocean currents are stagnant or when circular currents and eddies cause the sewage to dilute into previously diluted sewage.

Sewer Use Restrictions and Industrial Source Control

In November of 1975, the Districts established regulations on dischargers into its system which limit certain toxic constituents that are difficult to remove during treatment. The adopted Sewer Use Ordinance established an industrial and commercial use permit system, set forth detailed requirements for effluent quality, and established charges for use of the Districts' facilities. In addition, the Ordinance established an expanded sampling and inspection program to assure compliance with discharge limitations. A phased program of industrial discharge limitations for heavy metals, cyanide, and chlorinated hydrocarbons (pesticides and polychlorinated biphenyls) took effect on July, 1976. Discharge limitations will become increasingly restrictive until July 1, 1980, when the limits will be evaluated to determine if additional restrictions are needed to meet the ocean effluent discharge requirements set forth in the Districts' discharge (NPDES) permit.

Activated Carbon Treatment System Pilot Plant (ACTS)

The Districts are developing a new activated carbon treatment process (ACTS) which has great potential.

Because of the very encouraging results of preliminary tests, the Districts applied for and received a \$3.5 million grant from EPA to design and construct a pilot plant to treat 1 mgd at Plant No. 2. This plant should provide the optimum design criteria for use in the possible design of a larger facility for secondary treatment. The Districts also requested that actions on the initial Plant No. 2 project report be delayed until the ACTS process was more fully assessed.

Effluent from the process meets most secondary treatment criteria and is effective in the removal of heavy metals and other toxic pollutants. The ACTS process appears to have several advantages over conventional treatment processes.

PROJECTED WASTEWATER FLOWS

The capacity needs of future treatment facilities are based upon projected increases in population and historic trends in sewage generation. However, there are several important factors which influence the need for capacity at the CSDOC treatment plants including:

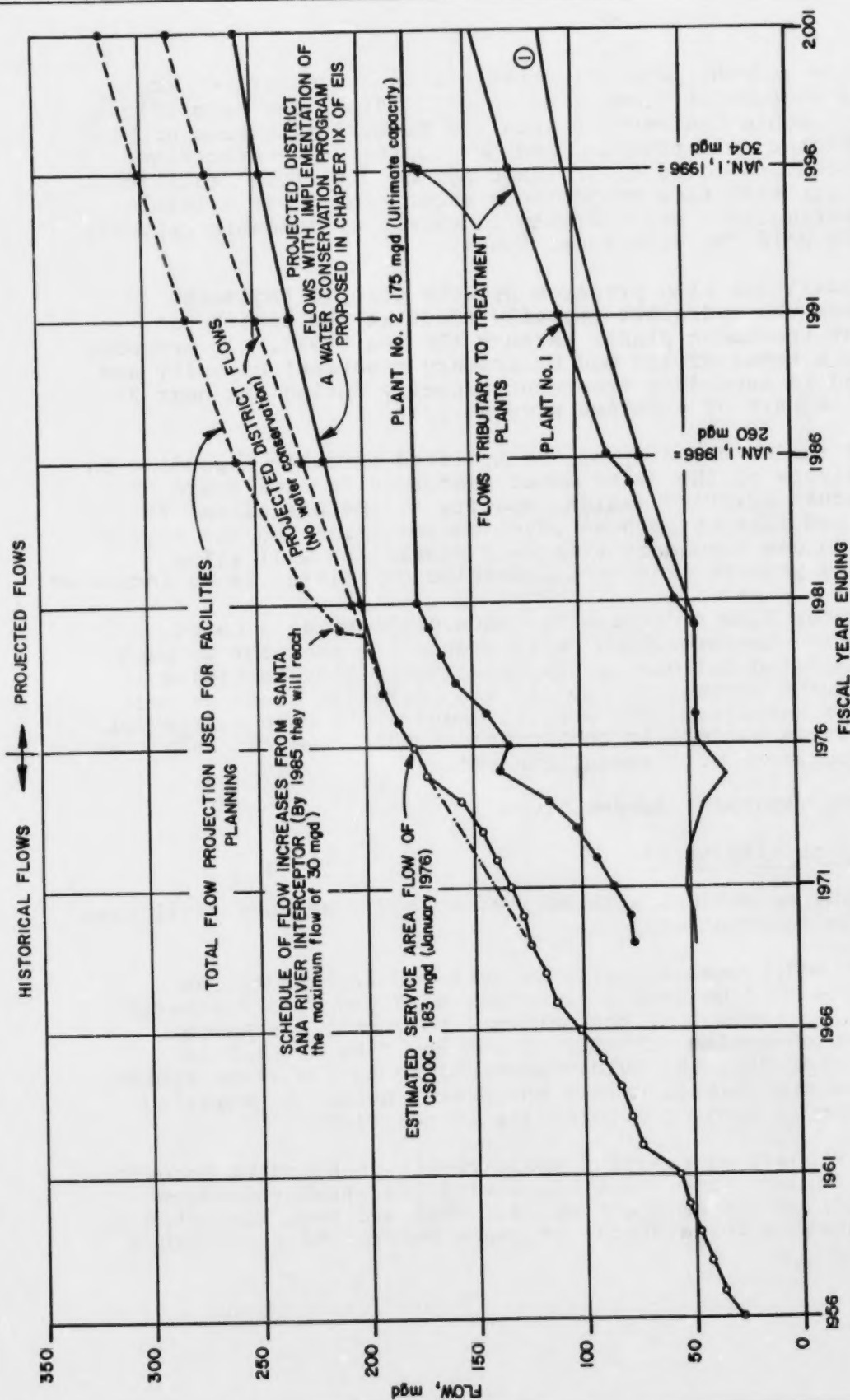
- High demand for housing and industrial capacity in the service area.
- Future mineralized (highly saline) flows from the Upper Santa Ana River Basin (San Bernardino and Riverside Counties) which may reach 30 mgd.

The following may also influence historic trends in capacity:

- Reductions in flows as a result of industrial pretreatment limitations.
- Reductions in future flows as a result of new water conservation legislation which mandates the use of low flow toilets in new developments.
- Potential reductions in existing and future flows through implementation of a comprehensive residential water conservation program.

A summary of the flows projected for both treatment plants and total flows under a variety of conditions is shown on Figure 3.

The treatment capacity which is eligible for grants from the State Water Resources Control Board is based upon a 10-year



① PREDICTED FLOWS WITH WATER CONSERVATION (See Chapter IX) FROM PLANT No. 1
 NOTE: FLOW PROJECTIONS USED FOR FACILITIES PLANNING ASSUME AN INCREASE IN
 TOTAL PER CAPITA FLOWS FROM 112 gpcd EXISTING (INCLUDES RESIDENTIAL,
 COMMERCIAL, AND INDUSTRIAL) TO 125 gpcd BY YEAR 2000.

PREDICTED FLOW TO JOINT WORKS

JBGA/KPL/MAD

11/76

FIGURE 3

E-O (low growth) population projection and existing per capita wastewater flows (100 gpcpd). Since the population growth within the service area has historically been growing at a higher rate than E-O and per capita wastewater flows have been projected to increase by the Districts' engineers, the Districts' flow projections exceed the grant eligible flow estimates. Any capacity in excess of fundable capacity must be paid for with local funds.

The facilities plan prepared by John Carollo Engineers assesses the hydraulic capacity needs at the Districts' two present treatment plants through the year 1996. It proposes adding a total of 132 mgd of primary treatment capacity and 180 mgd in secondary treatment capacity during the next 20 years as part of a phased program.

Actual funded capacity may be modified somewhat depending on an analysis by the State Water Resources Control Board of the actual existing design capacity at the Districts' facilities and factors such as water conservation and the degree to which new secondary treatment facilities will allow existing primary treatment hydraulic capacities to be increased.

Wastewater flow reduction has been proposed as a major mitigation measure which could reduce the need for as much as 24 million gallons in new capacity by 1996 resulting in significant savings in capital and operating costs as well as other benefits. The effectiveness of these conservation programs is subject to conjecture at this time and only time and experience will reveal the effects.

PROPOSED TREATMENT ALTERNATIVES

No Project Alternative

Under the no project alternative, no new treatment facilities would be constructed.

Without additional capacity or improved treatment, the Districts will be unable to comply with proposed discharge permit limitations of the National Pollutant Discharge Elimination System (NPDES). Fines could be as high as \$25,000 per day, and future connections to the sewer system could be prohibited. Unless there are changes in existing laws, the No Project alternative is not viable.

The No Project alternative would result in blending secondary level effluent from Plant No. 1 with less-than-secondary level effluent from Plant No. 2. This had been advocated by the Districts for a number of years before EPA established

secondary treatment requirements for ocean discharges and before the State issued its "Ocean Plan" requirements. Additionally, the No Project alternative would result in no increased capacity thereby causing a potential prohibition on increased sewer connections.

If the Districts made no additional efforts to build secondary treatment facilities (beyond that now planned and under construction or design), their blended effluent from Plants No. 1 and No. 2 could still meet many of their NPDES permit conditions (see Table 5).

Secondary Treatment Alternatives

The facilities plan sets forth alternative treatment processes to meet permit limitations at each of the Districts' treatment plants. These are described below:

PLANT NO. 1 SECONDARY TREATMENT ALTERNATIVES (all alternatives include 80 mgd of additional primary capacity)

<u>No.</u>	<u>Description of Additional Facilities</u>
1-A	Oxygen-Activated Sludge (O ₂ AS)--convert the existing 46 mgd air-activated sludge and construct facilities to provide 80 mgd of new secondary treatment capacity for a total capacity of 126 mgd.
1-B	Activated Carbon (ACTS)--add 80 mgd of new capacity using the ACTS process to bring total capacity to 126 mgd.
1-C	Air-Activated Sludge (AS)--expand existing air-activated sludge facilities to 126 mgd.

No. PLANT NO. 2 SECONDARY TREATMENT ALTERNATIVES (all alternatives include 36 mgd of additional primary capacity)

2-A	Oxygen-Activated Sludge (O ₂ AS)--100 mgd O ₂ AS secondary treatment capacity to bring total plant capacity to 175 mgd.
2-B	Activated Carbon (ACTS)--100 mgd new facilities using the activated carbon treatment process. Modify some existing primary treatment facilities for use in the ACTS process.

A comparison of the alternative projects including economic

TABLE 3

SUMMARY COMPARISON OF PLANT NO. 2 ALTERNATIVES¹

	Alternatives			No Project ²
	2A, Pure Oxygen Activated Sludge	2B, ACTS (Best Performance Conditions)	2B, ACTS (Minimum Performance Conditions)	
Economic				
Capital Costs (million \$)	121.4	99.0	172.1	10-20 ³
Total Annual Costs (million \$)	16.2	14.1	24.0	8.0
Total Cost/MG Treated (\$)	444	386	657	200 (Est)
Typical Homeowner Cost (\$/yr)	80-150	65-125	113-213	30-60
Construction Employment (# persons)	200-400	200-400	200-400	No Increase
O&M Employment Increase (# persons)	10-15	10-15	10-15	No Increase
Construction & Operation Impacts				
Construction Impacts				
Land Use Increase (acres)	27	20	23	No Change
Height of Tallest Structure (ft)	60	40	40	60
Operational Impacts				
Resource Utilization (increase, tons/yr)				
1. Polymers	27	38	76	20
2. FeCl ₃	0	1,522	7,610	0
3. Chlorine	765	761	761	150
4. NaOH	100	97	97	Minor Usage
Energy Utilization				
1. Purchased Power Required (Kwh/day)	200,400	257,200	336,500	180,000
2. Equivalent Power Generated by Digester Gas (horsepower)	8,550	None	None	6,300
Sludge Produced (dry tons/day)	336	243	243	174
Truck Traffic (# trips/day)	22-25	10-13	15-18	8-10

¹Addition of 48+ mgd of primary treatment capacity and 100 mgd of secondary treatment capacity totaling 175 mgd.²Existing and proposed facilities under design (138 mgd primary + 75 mgd secondary).³For primary capacity and anaerobic digestion facilities (excludes costs of 75 mgd now proposed).

TABLE 4
SUMMARY COMPARISON OF PLANT NO. 1 ALTERNATIVES¹

	Alternatives				
	IA, O ₂ AS (Oxygen Acti- vated Sludge)	IB, ACTS (Best Performance Conditions) ²	IB, ACTS (Minimum Perfor- mance Conditions) ²	IC, AS (Activated Sludge)	No Project (Partial Secondary) ³
Economic					
Capital Costs (million \$)	108.8	93.7	145.7	122.2	None
Total Annual Costs (million \$)	13.9	12.7	20.0	16.2	4-6
Total Cost/MG Treated (\$)	476	419	655	521	350
Typical Homeowner Cost (\$/yr)	80-150	65-125	113-213		80-150
Construction Employment (# persons)	200-400	200-400	200-400	200-400	None
O&M Staff Increase (# persons)	10-15	10-15	10-15	10-15	None
Construction & Operation Impacts					
Construction Impacts					
Land Use Changes (acres)	29	15	20	41	No Change
Height of Tallest Structure (ft)	60	40	40	40	40
Operational Impacts					
Resource Utilization (increase, tons/yr)					
1. Polymers	22	31	72	22	5
2. FeCl ₃	0		6,090	0	0
3. Chlorine	765	1,220	760	910	100
4. NaOH	100	97	97	100	0
Energy Utilization					
1. Purchased Power Required (kwh/day)	165,000	106,700	177,700	116,700	58,300
2. Equivalent Power Generated by					
Digester Gas (horsepower)	5,900	0	0	6,300	3,600
Sludge Produced (dry tons/day)	94	40	40	94	54
Truck Traffic (# trips/day)	16-18	7-9	9-11	17-19	5-6

¹Addition of 80 mgd of primary treatment capacity and 80 mgd of secondary treatment capacity.

²Activated Carbon Treatment System.

³Existing facilities (46 mgd of primary and secondary treatment).

factors and construction impacts is presented in Tables 3 and 4.

The final determinations of the capacity, phasing, level and type of treatment, and types of mitigation measures will be made only after:

- Public and agency comment is received.
- The Final EIS is completed and approved.
- Pilot testing of the ACTS treatment process is essentially completed.

Project Phasing

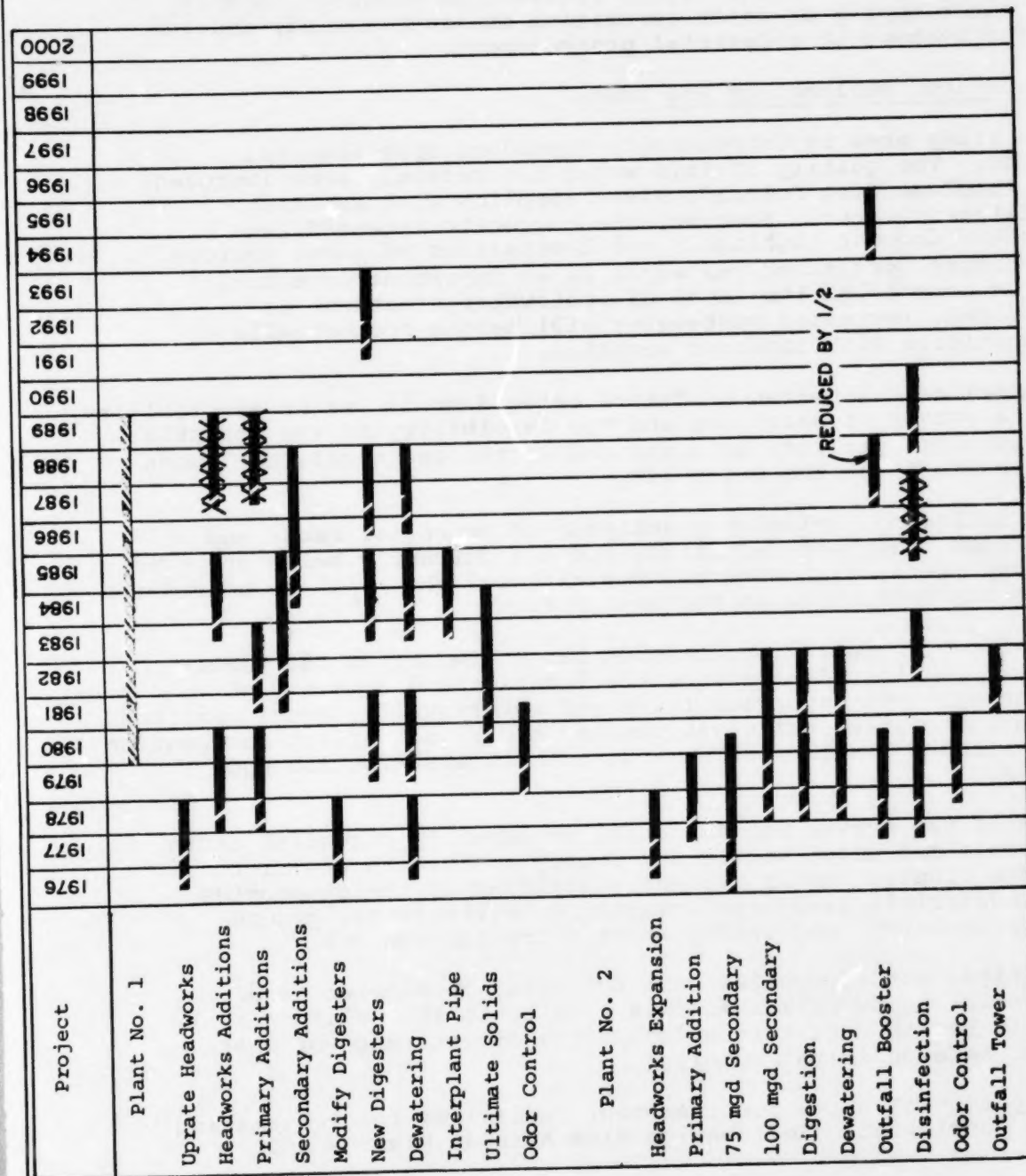
The Facilities Plan prepared by John Carollo Engineers contains a detailed summary of the individual process additions needed at the Districts' two existing plants. The additions, when constructed, will provide complete primary and secondary treatment for 300 mgd of influent wastewater flow. Figure 4 summarizes the proposed capacity additions through the year 1996 at both the Districts' plants. Not shown in this table are the effects of proposed wastewater flow reduction mitigation measures.

Future alterations will be subject to review by EPA and the SWRCB. The pending reliability projects to upgrade the existing primary sedimentation basin capacity at each plant will assure adequate standby capacity once secondary treatment facilities are on-line.

Figure 4 shows a schedule (John Carollo Engineers, 1977) for implementation of the joint works facilities through the year 1996. This schedule as presently proposed is unacceptable to EPA and the SWRCB for funding purposes due to the incompatible phasing of primary and secondary treatment. It is an expressed policy of EPA not to fund additions of primary capacity unless they include an equal increment of secondary treatment capacity. The present schedule proposed by the Districts calls for immediate additions of primary treatment before additional secondary treatment facilities are on line. This tentative schedule and phasing remains unresolved pending overall State and Federal review of the Facilities Plan. This issue will be resolved in the Final EIR/EIS.

Present and Projected Effluent Quality

Improved treatment and effective source control will result in improved effluent quality. The values shown on Table 5



PROPOSED IMPLEMENTATION SCHEDULE FOR
IMPROVED TREATMENT

are only estimates based on removals to be achieved by secondary treatment processes and the existing source control ordinance. Other factors which may affect effluent quality include: water conservation, reclamation projects, changes in water supply or water generation characteristics, and the effectiveness of industrial pretreatment.

Wastewater Reclamation and Reuse

The study area is increasingly dependent upon imported water. The quality of this water has recently been improved by supplementing Colorado River supplies with Northern California water. However, the currently intensifying Western drought highlights the limitations of these sources. Therefore, reclaimed wastewater is an important potential water source. As the level of wastewater treatment is improved, reclaimed wastewater will become economically competitive with imported supplies.

A detailed evaluation of future water demands, water availability, and a survey of water use and the feasibility of two potential reclamation projects is contained in the Technical Supplement (Appendix K) of the Draft EIS.

The following preliminary analysis of potential reuse and advanced treatment facilities are not currently being proposed as facilities plan alternatives although they will be considered in a separate stage in the near future.

The issue of future reclamation has an impact on the facilities planning effort since the location and capacity of secondary treatment facilities and water quality considerations (i.e., dissolved salts and metals, etc.) will affect reclamation potential. Plant location also affects distribution and costs.

A water use survey was conducted to identify potential users of reclaimed water within the County Sanitation Districts of Orange County. Water use was classified in the categories of industrial, landscape irrigation, agriculture, groundwater recharge, and saline water intrusion control.

Municipal water supplies were not being considered as a potential reuse market at this time since the California Public Health Regulations forbid the direct reuse of wastewater as a municipal supply.

Two potential sites for treatment facilities for reclamation were considered: Reclamation Site A is at Plant No. 1

TABLE 5

PRESENT AND PROJECTED EFFLUENT QUALITY

Constituent	NPDES Limitations ¹	Existing Effluent 1976	Partial Secondary 1980 ²	Full Secondary (after 1985)
Flow, mgd	184.0	178.0	235.0	260.0
BOD ₅ , mg/l	30.0	197.0	114.0	<30.0
Suspended Solids, mg/l	30.0	130.0	81.0	<30.0
pH, units	6.0-9.0	7.3	7.3	7.3
Grease and Oil, mg/l	10.0	40.0	19.0	<10.0
Floating Part., mg/l	--	3.07	2.0	<1.0
Settleable Solids, mg/l	0.1	0.5	0.4	<0.1
Turbidity, FTU	50.0	86.0	40-60	5-20
Arsenic, mg/l	0.01	<u>0.003</u>	<u><0.003</u>	<u><0.003</u>
Cadmium, mg/l	0.02	<u>0.04</u>	<u>0.02</u>	<u><0.02</u>
Total Chromium, mg/l	0.005 ³	0.19	0.12	0.05
Copper, mg/l	0.20	0.37	<u>0.20</u>	<u><0.20</u>
Lead, mg/l	0.10	0.12	<u><0.10</u>	<u>0.05</u>
Mercury, mg/l	0.001	<u><0.001</u>	<u><0.001</u>	<u><0.001</u>
Nickel, mg/l	0.10	<u>0.15</u>	<u>0.10</u>	<u><0.10</u>
Silver, mg/l	0.02	<u>0.009</u>	<u><0.01</u>	<u><0.01</u>
Zinc, mg/l	0.30	0.54	<u>0.28</u>	<u>0.10</u>
Cyanide, mg/l	0.10	0.11	<u>0.08</u>	<u><0.08</u>
Phenolic Compounds, mg/l	0.5	<u>0.18</u>	<u><0.18</u>	<u><0.18</u>
Ammonia-Nitrogen, mg/l	30.0	31.8	<u>30.0</u>	<u>30.0</u>
Total Identifiable Chlorinated Hydrocarbons, µg/l (less PCB's)	2.0	<u>0.13</u>	<u><0.1</u>	<u><0.1</u>
Toxicity, toxic units	1.5	<u>1.35</u>	<u>1.0</u>	<u><1.0</u>
Polychlorinated Biphenyls, µg/l	-- ⁴	2.78	<2.0	<1.0
Total Nitrogen	no limit	36.0	35.0	35.0
Total Phosphorus	no limit	28.0	21.0	13.0

NOTE: Underlined values indicate compliance with NPDES limitations. This does not necessarily mean that all marine life is protected from toxic effects or bioaccumulation.

¹Values not to be exceeded 50 percent of the time, (applicable July 1, 1978).

²No project alternative - includes ongoing 46 mgd and 75 mgd secondary treatment projects and implementation of existing source control program. Please note that removals achievable by pretreatment are only estimates.

³This stringent limitation may be relaxed to 0.05 mg/l.

⁴PCB's are included separately, but are included as part of total identifiable chlorinated hydrocarbons in NPDES limitations.

located in Fountain Valley at the intersection of Ellis Avenue and the San Diego Freeway; Site B is the location of the proposed Anaheim Forebay wastewater reclamation project near the intersection of Kraemer Boulevard and the Riverside Freeway.

Results of the water use survey indicated a use potential for reclaimed water of 161,082 acre-feet (52.5 billion gallons or an average annual use of 143.8 mgd) annually. Actual reclaimed water use will depend upon the water quality requirements of individual users and the costs of treatment and delivery.

At both sites A and B, conventional primary and secondary wastewater treatment would be followed by treatment using a series of advanced processes including chemical precipitation, filtration, and desalting.

The estimated costs of the proposed reclamation alternatives and the total unit cost per million gallons treated are 2.5 and 3 times higher than cost of providing secondary treatment alone and much higher than the costs of alternative water supplies from Northern California or the Colorado River. However, the reclaimed water supplied would be of a quality superior to existing water supplies. Cost differences would be offset somewhat by the savings in consumer costs from hard water and the resulting savings from not have to develop and build new water supplies. It must be noted that the alternative supplies are subsidized by taxes and lower power rates. The "real cost" to society of these alternative supplies may be higher than the cost of the reclaimed water. More analysis is needed, but it is beyond the scope of the CSDOC Facilities plan.

Such a high level of treatment could provide water suitable for many municipal and industrial uses (except for direct reuse in domestic supplies and by food processing industries).

It may be possible to provide a less expensive level of treatment for many uses (agriculture, landscape irrigation, industrial process water), and depending upon the mineral content it may be possible to use filtered and chlorinated secondary effluent for irrigation. This would reduce the costs noted above and possibly make reclamation immediately viable if adequate uses are found for the higher IDS (more salty) water.

PRIMARY (DIRECT) IMPACTS

The following sections describe the primary impacts expected

to occur with implementation at one of the project alternatives.

Construction Impacts

Construction of the proposed facilities will create local increases in noise, dust, traffic, air pollutant emissions, and energy usage which generally accompany any projects of a similar magnitude. Substantial investments of capital, materials (steel, concrete, and miscellaneous equipment), energy, and labor will be required to build new treatment facilities.

Operational Impacts

Operation of the completed facilities will require substantial amounts of energy and chemicals (Tables 3 and 4). Chemical usage of polymers, ferric chloride, chlorine, and sodium hydroxide will be substantial. Purchased energy requirements for full secondary treatment and additional capacity could be equivalent to about 222,000 bbls of oil a year.

Truck and vehicular traffic, noise, and local air pollutant emissions will increase near the treatment plants. Sludge production will increase by a third plus the sludge generated from the increased capacity. The problems of treatment and disposal of hundreds of tons of sewage solids a day will be compounded until an ultimate solution to this problem is resolved by the regional sewage solids study now underway.

Economic Impacts

Implementation of full secondary treatment and additional capacity for growth (assuming full grant funding) will increase local costs for wastewater treatment. To the typical homeowner this means an increase of \$2 to \$3 a month over the "no-project" alternative. Costs to industrial and commercial enterprises will also increase substantially. Without State and Federal grants, local costs could be increased by as much as \$6 to \$9 a month over present costs and increase local bonded indebtedness assuming a bond election were successful. Approximately 200-400 additional jobs will be created during construction of the facilities and permanent jobs will be created for plant operation needs.

Social Impacts

Improved treatment may reduce the potential for odor generation associated with the waste water treatment but may create more

nuisances associated with solids handling and disposal. Construction and operation of new facilities will stimulate the local economy, create additional jobs, improve the quality of wastewater effluents discharged to the ocean, and provide for greater reclamation potential.

Impacts on the Marine Environment

Perhaps two of the most important impacts are improvement of the marine environment and protection of public health.

Existing and anticipated effects on the marine environment and water quality are summarized in Tables 6, 7, and 8.

SECONDARY IMPACTS

The secondary impacts of the population increases (approximately 690,000) accommodated by the proposed increase in treatment capacity will be substantial.

Population growth and its associated increases in vehicle miles traveled, air pollutant emissions, solid waste, etc., demands for energy, water, and community services (police and fire protection, schools, etc.), and induced changes in land use through demands for housing and commercial and industrial development will aggravate existing impacts on the environment and demands for natural resources. The most significant secondary impacts are the deterioration of air quality and, to a lesser extent, the loss of agricultural land. A summary of secondary impacts is contained in Table 9.

MAJOR ENVIRONMENTAL ISSUES

The foregoing sections presented a background of the Facilities Planning and EIS process. Throughout this process we have tried to focus on a number of questions which seemed basic to the development of a rational wastewater plan. These major environmental questions as identified by EPA, the District, the State Water Resources Control Board and the public are discussed in the following sections:

Water Quality

What adverse impacts presently occurring in the ocean may be reasonably attributed to wastewater discharges? What concentrations of pollutants should be permitted to protect the marine environment? What amount of treatment or wastewater management (e.g. industrial pretreatment) reduces the pollutant

TABLE 6
SUMMARY OF EFFECTS ON THE MARINE ENVIRONMENT
FROM THE CSDOC DISCHARGE

Effects	Existing Discharge, 1976 (Primary Treatment)	Partial Secondary, 1980	Full Secondary, 1985 and Beyond
Water Quality Effects			
Increase in suspended solids in the water column	15% increase near outfall diffuser	Decrease in suspended solids (60%) with a reduction in impact	Impact negligible, suspended solids reduced 80%
Dissolved oxygen depression	0.5% reduction near outfall diffuser	Negligible effect	Negligible effect
Change in pH	1% increase over diffuser, minor effect	No change in present effect	No change in present effect
Reduction in water clarity and light penetration	31% reduction in light penetration near outfall diffuser	Substantial improvement (60%) through a reduction in suspended solids	Impact relatively minor with an 80% reduction in suspended solids
Change in sediment composition	Changes in sediment organic content are highly variable due to transport and biological utilization of settleable organics. The area in the immediate vicinity of the diffuser experiences high inputs of organic matter, but no permanent buildup is indicated. However, acid-volatile sulfides have increased fourfold since 1970. Metals concentrations are as much as 5 times higher (Cd) near the outfall diffuser. Chlorinated hydrocarbons in sediments greatly exceed effluent concentrations indicating they are accumulating in the sediments.	Reduction in effects on sediments; settleable solids reduced 20%; concentration of other cumulative conservative pollutants reduced 20-50%	Effect on sediments greatly reduced; concentrations of settleable solids, suspended solids, and toxic pollutants greatly reduced; fewer settleable materials will mean that local accumulation of organic material and pollutants will be greatly reduced
Increase in floating particulates in surface waters	Up to 3 times higher near the outfall than at control areas	Concentrations reduced by about 33%	Concentrations reduced by about 67%
Formation of surface films	Occasionally detectable during routine monitoring; may be visible from the air or by boat when the effluent field surfaces	Potential for formation of surface slicks greatly reduced (50%)	Potential for formation of surface slicks reduced substantially (75%)
Biological Effects			
Change in phytoplankton growth and abundance	The actual effects have not been quantified, but the discharge may be having either biostimulatory or toxic effects. Theoretically, inputs of nitrogen could enhance productivity as much as 7 times background levels if there are no toxic effects from substances such as PCB's.	Reduced potential for toxic effects; no change in nutrient inputs; beneficial biostimulatory potential improved	Potential adverse effects greatly reduced; no change in nutrient inputs; beneficial biostimulatory potential enhanced
Effects on sediment organisms	Biomass in the area northwest of the diffuser exceed background values by almost 3 times. Abundance near the outfall has undergone a major long-term change, decreasing from 15,000 animals/m ² in 1970 to about 5,000 animals/m ² in 1975. Overall species diversity has decreased, while the abundance of <i>Parvilucina</i> (a small clam) and <i>Euphilomedes</i> (an ostacod crustacean) have increased.	Reduced input of settleable organic material and toxic materials; species diversity and abundance may change to conditions which were found before the discharge was initiated.	Substantial reduction in organic and toxic materials inputs; benthic conditions can be expected to return to pre-discharge conditions; toxic effects greatly reduced

TABLE 6
(continued)
SUMMARY OF EFFECTS ON THE MARINE ENVIRONMENT
FROM THE CSDOC DISCHARGE

Effects	Existing Discharge, 1976 (Primary Treatment)	Partial Secondary, 1980	Full Secondary 1985 and Beyond
Effects on fish populations	There has been an increase in fish abundance near the outfall diffuser and no significant changes in fish diversity near the outfall. However, other more distant monitoring stations have shown variable increases and decreases in diversity and abundance. There may be general decreases in the Bight (coastal waters) due to the cumulative impact of all the sewage discharges.	Possible local reduction in fish abundance to pre-existing conditions; potential for toxic effects reduced.	Relatively minor impact on marine fisheries; potential toxic effects greatly reduced. General Bight environment should improve as other agencies also build secondary.
Effects on Invertebrates	No apparent reduction in abundance or density of potential macroinvertebrate indicators such as the sea cucumber <u>Parastichopus</u> .	No significant change from existing conditions; reduced inputs of settleable organics and toxic pollutants	Relatively minor impact.
Microbiological impact	Increased bacterial concentrations in waters which exceed stringent standards for shellfish growing waters; shellfish in some areas exceed public health standards; waters are generally safe for recreational uses except when adverse current conditions occur.	Concentrations of bacteria and viruses in effluent, shellfish, and nearshore waters reduced	Significant reduction in concentrations of bacteria and viruses in effluent, shellfish and seawater

TABLE 6 (continued)

Effects	Existing Discharge, 1976 (Primary Treatment)	Partial Secondary, 1980	Full Secondary 1985 and Beyond
Effects on disease incidence in marine organisms	Increases in tumors or other deformities in fish may be related to wastewater discharges. Fin erosion in fish, soft-shelled eggs in birds, and premature pupping among sea lions may be related to PCB's and other chlorinated hydrocarbons from municipal wastewater discharges.	Reductions in potential pollutants will reduce potential for disease incidence and bioaccumulation	Reductions in potential pollutants will significantly reduce potential for adverse effects
Toxic effects	No known acutely toxic effects from the present discharge. Chronically toxic effects on organisms may result from bioaccumulation of metals, chlorinated hydrocarbons and other pollutants. Subtle long-term effects on reproduction, growth, or survival. Uptake and accumulation may not have noticeable adverse effects on edible marine organisms, but could have effects on humans who consume seafoods contaminated by cadmium, pathogenic microorganisms, or chlorinated hydrocarbons.	Potential adverse effects reduced	Potential adverse effects greatly reduced; concentrations of toxic materials will be substantially lower
Impacts on Fauna	Cumulative effect of wastewater discharges considered significant in reduction of kelp beds in the Bight. Toxics and BOD are both suspect.	Reduced inhibition of kelp bed growth	Significantly reduce the potential for adverse impacts on kelp

TABLE 7
POLLUTANT CONCENTRATIONS AND THEIR CHRONIC EFFECTS ON MARINE ORGANISMS

Constituent	Concentration (mg/l = ppm)			Concentration (ppm)			EPA Minimum Risk Criteria (mg/l, ppm)	ppm Concentration in Laboratory Bioassay	Species	Chronic Effect (sublethal)	Reference
	Existing Effluent (No Project)	Blended Film Effluent	Diluted Effluent (100:1 dilution)	Existing Effluent (No Project)	Blended Film Effluent	Secondary Effluent					
Trace Metals											
Cadmium	.04	.02	.0004	.0004	.0002	.0002	.0002	.1	Phytoplankton	Reduced photosynthesis	BOCMF, 1975
Chromium	.19	.12	.0019	.0012	.0012	.0012	.05	--	--	--	--
Copper	.42	.20	.0042	.0020	.0020	.0020	.01	.01	Sea urchin (embryo)	Abnormal development	Okubo & Okubo, 1962
Lead	.16	.10	.0016	.0010	.0010	.0010	.01	.014	Paracentrotus	Modified sublethal response	Klock & Pearson, 1961
Mercury	<.001	<.001	<.00001	<.00001	<.00001	<.00001	<.0001	.0015	Sea urchin (embryo)	Abnormal development	Wilber, 1969
Nickel	.15	.10	.0015	.0010	.0010	.0010	.02	--	--	--	--
Silver	.012	.01	.0012	.00012	.00012	.00012	.0001	.002	Sea urchin (embryo)	Delayed development of and caused deformation of larvae	Soper, 1963
Zinc	.65	.10	.0065	.0010	.0010	.0010	.02	.25	Marine phytoplankton: <i>Thalassiosira pseudonana</i> , <i>Thalassiosira weissflogii</i> , <i>Paracoccus</i> , <i>Paracoccus</i>	Reduced photosynthesis and growth	BOCMF, 1975
Other Toxicants											
Ammonia	33	30	.33	.33	.33	.33	0.1 (96 hr LC50) M.T.E. 0.01 ¹	3.5-10	Chinook salmon	Reduction in growth and loss of equilibrium	Holland, et al., 1960
Phenol	.8	<.8	.008	.008	.008	.008	0.05 (96 hr LC50) M.T.E. 0.1 ^{1,2}	4.5 ²	Oncorhynchus tshawytscha	Epithelial cell damage in 2 hrs; severe reproductive system damage in 7 days	Mitrovic, et al., 1968 ³
Cyanide	.1	.08	.001	.001	.001	.001	0.1 (96 hr LC50) M.T.E. 0.05 ¹	.01	Salmonid fish	Permanent inhibition of swimming ability (in fresh water) ¹	EPA, 1972
Polychlorinated Biphenyls	<.002	<.001	<.00002	<.00002	<.00002	<.00002	<1 x 10 ⁻⁶	.0001	Phytoplankton	Inhibited growth	Fisher & Munster, 1973
Pesticides											
Aldrin	<.015	<.006	<.00015	<.00015	<.00015	<.00015	-- ⁴	present	Oyster	Converts to dieldrin	EPA, 1973
Chlordane	<.015	<.006	<.00015	<.00015	<.00015	<.00015	-- ⁴	present	Oyster	Trophic accumulation	--
DDT ⁵	<.06	<.024	<.0006	<.0006	<.00024	<.00006	-- ⁴	.001	American oyster	Weight difference between control and experimental oysters	Loew, et al., 1971
Dieldrin	<.015	<.006	<.00015	<.00015	<.00015	<.00015	-- ⁴	present	<i>Crassostrea virginica</i>	Trophic accumulation	Wolman & Wilson, 1970
Endrin	<.03	<.012	<.0003	<.0003	<.00012	<.00003	-- ⁴	present	Grey whale	Trophic accumulation	Wolman & Wilson, 1970
Heptachlor	<.015	<.006	<.00015	<.00015	<.00015	<.00015	-- ⁴	present	Brown pelican	Trophic accumulation	Riedel, et al., 1968
Lindane	<.015	<.006	<.00015	<.00015	<.00015	<.00015	-- ⁴	present	Bald eagle	Trophic accumulation	Krantz, et al., 1970
Methoxychlor	N.D. ⁶	--	--	--	--	--	-- ⁴	present	Sand shrimp	Trophic accumulation	Klaser, 1969
Toxaphene	N.D. ⁶	--	--	--	--	--	-- ⁴	present	Bay mussel	No trophic accumulation	EPA, 1973

¹LC50 - Median Lethal Concentration: The concentration of a test material that causes death to 50 percent of a population within a given time period. M.T.E. = not to exceed.

²ppm water investigation.

³See table for effects in salt water. However, EPA Minimum Risk Criteria is for salt water application.

⁴Includes: pp-DDT, pp-DDD, pp-DDD-olefin, pp-DDD, pp-DDD, pp-DDD, pp-DDD.

⁵Not detected.

TABLE 9

SUMMARY OF SECONDARY IMPACTS

	Existing Service Area	10-year Increase CSDOC Projection	10-year Increase Low Growth (E-O)	Difference	% Change from Existing Conditions	
					CSDOC Projection	E-O Projection
Population Increase	1,519,800	440,000	292,000	148,000	+29	+19
Estimated Number Housing Units ¹	546,000	165,000	106,000	44,000	+30	+19
Estimated Number of Students Enrolled in Public and Private Schools	450,000	130,000	86,000	44,000	+29	+19
Estimated Local Employment	514,000	274,000	182,000	92,000	+53	+35
Estimated Wastewater Flow, mgd ²						
No Water Conservation	175	47	30	17	+27	+17
With Water Conservation	175 ³	22	16	6	+13	+9
Number of Motor Vehicles	1,046,300	295,000	195,000	100,000	+28	+19
Vehicle Miles Traveled	26,046,000	7,486,000	4,968,000	2,518,000	+29	+19
Air Pollution Emissions (tons/day)						
Total Organic Gases	207.5	27.2	19.9	7.3	+13	+10
(Reactive Portion)	(142.2)	(14.1)	(10.3)	(3.8)	+10	+7
Particulate Matter	29.5	7.7	5.6	2.1	+26	+19
Oxides of Nitrogen	167.6	16.6	12.2	4.5	+10	+7
Oxides of Sulfur (as SO ₂)	29.6	6.3	4.6	1.7	+21	+16
Carbon Monoxide	1,091.0	71.9	52.6	19.3	+7	+5
Water Supply Needs, mgd						
No Water Conservation	288.76	65.34	47.39	17.55	+23	+16
With Water Conservation	288.76 ³	47.45	34.71	12.74	+16	+12
Energy Demand						
Electrical (kwh x 10 ⁶ /day)	7,453	3,661	2,670	991	+49	+36
Natural Gas (10 ⁶ cfd)	2,114	612	406	206	+29	+19
Gasoline (gal/day)	2,142,900	313,000	228,000	85,000	+15	+11
Solid Waste Generation						
Municipal Refuse (tons/day)	19,000	5,510	3,650	1,860	+29	+19
Land Use (acres)						
Agricultural	3,100	Projected Change ⁴	Projected Change ⁴			
Residential	82,407	-1,500	-995 (est) \$	505	-48	-32
Commercial	12,599	+6,635	+4,403 (est) \$	+2,232	+8	+5
Industrial	11,797	+2,866	+1,902 (est) \$	964	+23	+15
Open Space and Other Acreage	41,723	+3,977	+2,625 (est) \$	1,352	+34	+22
Total Developed Acreage	148,526	+1,400	+924 (est) \$	476	+3	+2
Total Undeveloped Acreage	39,955	+14,878	+9,819 (est) \$	5,059	+10	+7
Total Undevelopable	4,172	-16,278	-10,743 (est) \$	5,535	-41	-27
Total	188,481					
Potential Service Area	34,062					
Ultimate Service Area	222,543					

¹Assumes 2.76 persons per dwelling unit (SCAG, 1976).²Excludes flow from S.A.R.I. (assumes 60 gpcpd; with water conservation).³Does not include reductions from existing population which can be achieved.⁴Includes existing and potential service area land use changes.⁵Proportioned on a population basis with CSDOC service area projections.

concentrations adequately? An additional marine issue which may need resolution is whether a BOD concentration of higher than the 30 mg/l requirement could be tolerated in terms of marine impacts. This issue may arise if the JPL-FACTS treatment method is substantially cheaper than other methods and attains comparable removal of pollutants except BOD. Presently all domestic wastewater discharges across the nation are mandated by PL 92-500 to achieve as a minimum a secondary level of treatment. As presently defined in EPA regulations, secondary treatment achieves at least a removal to 30 mg/l for both BOD and total suspended solids (TSS).

System Capacity

What additional treatment capacity is needed? Existing capacity is 184 million gallons per day (mgd) which is proposed to be increased by 116 mgd to a total of 300 mgd to serve the projected population in the year 1996. What are the primary and secondary effects associated with this increase? What effects will continued CSDOC service area population growth have on air quality, agricultural land use, transportation systems, and resource utilization?

Wastewater Reuse

What is the potential for wastewater reuse and what are the associated economic, environmental, and public health effects? How rapidly should programs be implemented?

Each of the above issues is discussed in more detail in following sections.

WATER QUALITY

For the past forty years, ocean waters off Southern California have served as a disposal area for solid and radioactive wastes and a variety of liquid wastes including sewage. Concern over the discharge of sewage wastes has resulted in a series of improvements in the systems to dispose of these wastes. As the volume and complexity of wastewater effluent from this highly urbanized and industrialized area have increased, so has the concern over the effects on marine resources, public health, and aesthetic values. This concern has resulted in more stringent State and Federal water pollution control legislation, discharge limitations, and a reexamination of many traditional wastewater treatment and disposal practices.

Impacts on the Marine Environment

The known and potential effects on the marine environment of

treated wastewaters discharged in Southern California are the subject of much debate. They are discussed in detail in the EIS and summarized below.

Major Effects of Wastewater Constituents

Settleable Solids--Settleable solids can change the benthic environment (ocean floor) in the immediate vicinity of the ocean outfall and affect benthic organisms by: forming bottom deposits; stimulating bacterial growth which depletes dissolved oxygen; increasing concentrations of hydrogen sulfide which is toxic to marine life; causing other adverse effects because they contain heavy metals, chlorinated hydrocarbons, phenolic compounds, and other organic and inorganic compounds; and serving as organic nutrients which stimulate or inhibit the growth of benthic organisms.

Suspended Materials--Particulate material in suspension may affect marine organisms both directly and indirectly:

Direct Effects:

- Decreasing light penetration by absorption and scattering thereby limiting primary productivity.
- Exerting an oxygen demand approximately eight times that of the same material in bottom deposits and release toxic materials to the water column.
- Clogging the gills of marine organisms resulting in impaired respiration.
- Settling on and smothering organisms or resulting in adverse environmental conditions by creating a high oxygen demand.

Indirect Effects:

- Carrying toxic constituents such as heavy metals and chlorinated hydrocarbons which can accumulate in marine sediments or be consumed and incorporated into the body tissues of marine organisms.
- Serving as food for marine organisms and having biostimulatory effects if toxicants

do not result in overall reduction in productivity.

BOD (Biochemical Oxygen Demand)--The components of wastewater contributing to the BOD index have been implicated in the propagation of sea urchins and the subsequent destruction of kelp beds off Southern California. BOD has also been suggested as a cause or contributing factor to "red tides". However, the connection with Red Tides is very tenuous.

Floatable Materials--Oil and emulsions may:

- Adhere to the gills of fish and thereby interfere with respiration and cause asphyxiation.
- Coat aquatic plants (such as kelp and other algae) and interfere with their respiration.
- Form surface slicks which can impair gas transfer between the atmosphere and ocean surface, entrap and asphyxiate pelagic organisms such as plankton, and form aesthetically objectionable surface and onshore deposits of grease and oil.

Floating Particulates Can:

- Shield pathogenic organisms from disinfection or prolong their survival in seawater. This poses a potential public health hazard if contaminated wastes are ingested by a swimmer or child playing along the beach.
- Attract and serve as a source of food for seabirds.

Toxicity--The pollutants present in municipal wastewater discharges can have toxic effects on marine life. These effects can be acute (occurring within a matter of minutes, hours, or days) or chronic where the effect takes longer to manifest itself. The effects range from sublethal effects on respiration, physiology, or growth and development, to death. Pollutants acting alone or in combination with others stress or weaken an organism so that its chances of survival are reduced. Sublethal chronic effects are difficult to diagnose and harder to predict due to the low and uncertain level of causative pollutants.

Trace Metals--Trace metals in wastewaters can have toxic effects on marine organisms living around the CSDOC. Data collected on marine organisms living around the CSDOC indicate the following:

- Most of the metals (Ag, Cd, Cr, Cu, Ni, Pb, Zn) contained in wastewaters originate in industrial waste discharges.
- A large percentage of the metals in treated wastewaters are attached to suspended solids or other particulate matter.
- Upon discharge, metals can either be released into solution, ingested with organic material, or be incorporated in sediments as fecal material or bioaccumulated.*
- Concentrations in sediments range from two to five times higher than background.
- Trace metals concentrations tend to decrease with distance from the outfall.
- Metals concentrations in seawater are currently so low that there are not likely to be any effluent-induced acutely toxic effects on marine organisms. However, there is concern over second or higher order effects as a result of biomagnification of metals, especially cadmium which can be concentrated to high levels and eventually result in adverse effects to higher trophic levels including man. (See Tables 10 and 11.)
- Preliminary data show that fish which normally contact sediments either while resting or feeding generally have higher flesh concentrations of trace metals than pelagic fishes living closer to the surface.

*Bioaccumulation is the ability of organisms to directly or indirectly (by consuming prey) concentrate pollutants in their body tissues. The magnitude of bioaccumulation is determined by the nature of the pollutant, the species, its exposure, feeding habits, metabolic rate, age and size, quality of the water, and environmental conditions.



Routine trawling studies are performed on a quarterly basis to measure any changes in the size, number, diversity, incidence of disease, and other characteristics of marine benthic fish populations. Fish are counted, measured, and identified; and analyses are made for heavy metals and chlorinated hydrocarbons.

Chlorinated Hydrocarbons--Chlorinated hydrocarbons (pesticides, polychlorinated biphenyls--PCB's--, and other organics such as chlorobenzenes) can have a number of toxic effects on marine organisms. Current information indicates that:

- DDT and its derivatives and PCB's are detectable in all levels of marine food webs in Southern California coastal waters as a result of uptake and bioaccumulation and deposition in marine sediments.
- Municipal wastewaters constitute the most significant local sources of both pollutants. Orange County did contribute as much as 38% of the wastewater PCB input to the Bight in 1974. With source control and limitations on PCB usage, the output has decreased significantly.
- DDT and its metabolic breakdown products such as DDE are believed to be responsible for eggshell thinning in the brown pelican population of the Southern California coast, the reduction of photosyntheses by marine phytoplankton, and accumulate in marine organisms to levels which may be unsafe for human consumption.
- There is concern over second or higher order effects as a result of biomagnification of pesticides and other organic compounds which can be concentrated to high levels and eventually result in adverse effects to higher trophic levels including man.
- There is a strong association between high levels of total PCB and fin erosion in Dover sole caught off Orange County. PCB may act with heavy metals or other pollutants to produce the disease symptoms.
- Water column studies near the CSDOC outfall using previously uncontaminated shellfish (bay mussels) indicate that in several weeks DDT and PCB's accumulate to concentrations exceeding 0.50 ppm dry weight (2.0 ppm wet weight). Such concentrations exceed recommended EPA criteria for use in evaluating shellfish quality for human consumption.
- PCB's are of low acute toxicity to humans,

TABLE 10

TRAWL FISH HEAVY METAL ANALYSES (MUSCLE TISSUE)*
mg/kg (ppm) dry weight

Date of Trawl	Ag	Cd	Cr	Cu	Ni	Pb	Zn
February 26, 1975							
Range	0.024-0.83	0.07-3.3	0.077-11.4	1.5-16	0.41-1.7	0.91-7.9	11-55
Average	0.27	0.85	1.12	8.0	1.1	3.5	34
Median	0.17	0.69	0.26	7.0	1.1	3.0	36
May 12, 1975							
Range	0.006-0.89	0.03-8.9	0.16-1.7	1.9-16	0.51-24	0.29-11	14-39
Average	0.32	2.14	0.75	6.6	10.9	1.09	26
Median	0.04	1.0	0.55	3.7	8.1	0.30	25
July 9, 1975							
Range	0.021-2.3	0.009-3.0	0.32-0.81	1.4-11	0.14-4.6	0.05-3.8	12-49
Average	0.63	0.98	0.52	5.14	1.44	1.44	23
Median	0.41	0.32	0.50	4.7	0.76	0.79	20
October 8, 1975							
Range	0.005-0.72	0.089-0.47	0.014-1.9	2.0-10	0.01-0.56	0.43-3.7	16-42
Average	0.153	0.25	0.22	5.56	0.25	1.26	28.5
Median	0.034	0.22	0.087	6.4	0.26	1.1	26
January 14, 1976							
Range	0.016-0.14	0.04-0.53	0.10-0.59	0.36-4.3	2.2-10	0.38-3.1	14-50
Average	0.042	0.27	0.28	2.3	5.65	1.0	31.1
Median	0.032	0.21	0.20	2.3	5.1	0.88	30
April 7, 1976							
Range	0.03-0.18	0.02-0.56	0.08-0.39	2.3-14	0.2-1.8	0.55-1.8	9.4-31.6
Average	0.09	0.35	0.21	5.1	1.03	1.12	22.3
Median	0.07	0.36	0.17	4.4	0.80	1.1	22.2

SOURCE: CSDOC Quarterly Monitoring Reports

*Summary of Data for All Species, February 1975-April 1976; assesses average bioaccumulation and food web contamination and general effects on humans.

TABLE II
TRACE METALS CONCENTRATIONS IN
THE MARINE ENVIRONMENT AND BIOTA
AROUND CSDOC OUTFALL NO. 2

Concentrations in:	Metal Concentrations ¹ (mg/kg, ppm, dry weight)					
	Silver	Cadmium	Chromium	Copper	Nickel	Lead
Seawater (average background concentration) ²	.00016	.0001	.0002	.002	.002	.00004
CSDOC Combined final effluent with 100:1 dilution ³	.00009	.0004	.0019	.0037	.0015	.0009
Combined final effluent without dilution	.009	.04	.19	.37	.15	.009
Background Sediments						
CSDOC Control Station	.40	.60	18	16	11	13
SCCWRP Values (1976) ⁴	no data	.05	34	14	9	10
Sediments within 1,000 ft. of outfall	1.0	2.6	32	36	14	39
Organisms (Range of Conc.)						
Ostracods ⁵	1.3-5.9	1.1-3.5	4.1-12.0	7.0-54	no data	4.1-23
Bivalves ⁶	1.3-28	1.7-8.6	0.5-32	1.3-55	13-360	9.2-23
Polychaetes ⁷	.06-.95	0.40-4.7	6.4-124	4.0-130	1.9-250	1.1-27
Trawl-caught Flatfish						
Flesh ⁸	.006-2.3	.009-5.4	.10-1.6	3.2-18.0	.14-20	.37-17.4
Rig-caught fish ⁹	.008-.66	.013-1.9	.065-1.0	.24-7.5	.28-8.4	0.2-4.2
						0.55-36

¹Mercury analyses are not routinely done, however, concentrations in sediments range from .01-.13 ppm.

²State Water Resources Control Board, 1976.

³1976 mean values and 100:1 initial dilution with seawater.

⁴Baseline values reported by SCCWRP for the Orange County Benthic Survey, 1976.

⁵Range of concentrations found in the whole body of Ostracod crustaceans found living in sediments collected at offshore monitoring stations.

⁶Based upon CSDOC Monitoring Reports, average of stations B-0, B-1, B-4, and B-9.

⁷Range of concentrations in the body tissues of Pectinaria, 1975-76.

⁸Range of values for all trawl stations, 1974-75.

⁹Range of values in flesh, 1974-76.

however they are suspected to be cancer causing agents. A high percentage of the population has accumulated detectable quantities of PCB's.

- Analyses of fish caught near the CSDOC outfall show the muscle tissue concentrations of total PCB range from 4.7 to 1.098 ppb. The highest concentrations have been found to occur in the liver of a California halibut and in the flesh of white croaker (for data see Appendix G). Such concentrations exceed EPA criteria for chlorinated hydrocarbons in fish established at 500 ppb and warrant concern with respect to consumption by marine birds, mammals and humans which are known to bioaccumulate PCB's to concentrations where they have toxic effects.
- High concentrations of PCB's have also been detected in marine invertebrates [pelecypod (mollusc), polychaete (annelid) worms, and ostracods and crabs (crustaceans)] living in or on sediments near the outfall. The sediments near the outfall contain concentrations of PCB's as much as 800 times higher than average effluent concentrations while one bivalve contained 35,400 ppb of total PCB. Such high concentrations indicate that bio-magnification is occurring.
- Concentrations of PCB's in the CSDOC wastewaters have been greatly reduced (85 percent) by the Districts' source control efforts, and concentrations averaged about 2 parts per billion during 1976. Improved treatment will reduce effluent concentrations as well as other pollutants even more.

Other Synthetic Chemicals. Pthalic Acid Esters, Carbamate pesticides, and possibly other chemicals of whose presence in the ocean we have very little information, may be identified in the future as sources of adverse impacts.

Disease in Marine Organisms. The possibility that wastewaters discharged into coastal waters are responsible for diseases and abnormalities in fishes and other marine organisms has generated much concern and stimulated local research on this subject. Fin erosion, skeletal

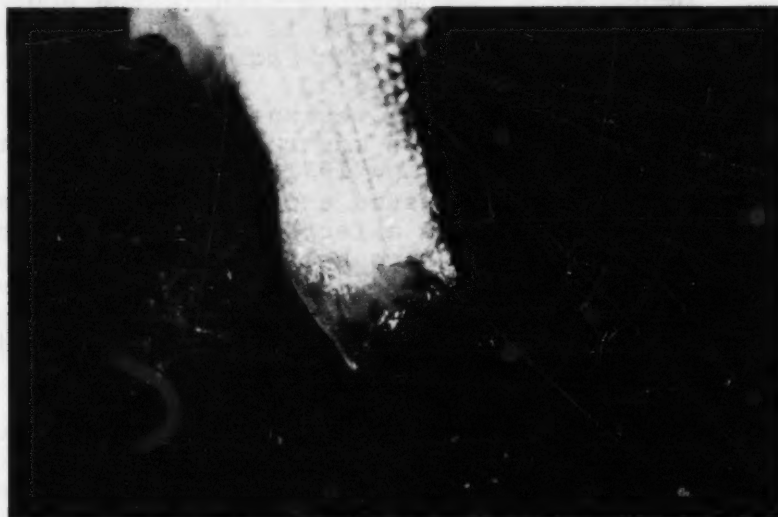
deformities, lesions, and fungal infections, physiological changes, and tumors have been found in marine animals. Each of these afflictions and its possible relationship to general ocean pollution is discussed below.

Fin Erosion--(See Figure 5) The most serious affliction identified is fin erosion found among Dover sole and a few other benthic fish species. Data collected by the Southern California Coastal Water Research Program (SCCWRP) and the various dischargers have shown that:

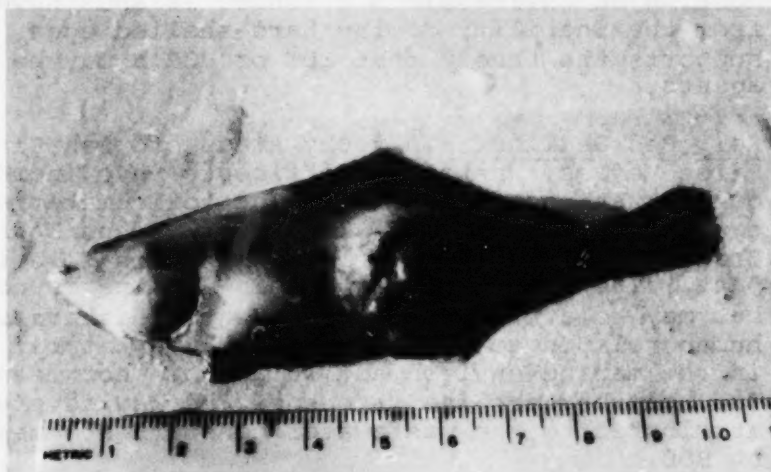
- Palos Verdes shelf is the primary site at which fin erosion occurs in the Dover sole and Rex sole with incidence as high as 43 percent. Incidence among Dover sole in San Pedro Bay where the CSDOC outfall is located is much lower (three percent). Dover sole caught off Dana Point were not afflicted. The incidence of fin erosion was as high as 54% of white croaker at the old Orange County 1 mile outfall. White Croaker do not tend to live at the lower depths of the new outfall.
- Laboratory studies of the tissues of affected species support the hypothesis that the disease is not of bacterial origin.
- Laboratory experiments show that adverse changes in fin condition can be induced in Dover sole by exposing healthy fish to contaminated Palos Verdes sediments. Analysis of various tissues suggest that one or more chlorinated hydrocarbons (DDT or PCB's) may be associated with the fin erosion disease.
- A preliminary comparison of the trace constituents in Dover sole and Starry flounder from Washington State with and without fin erosion suggests that total PCB is elevated in the tissues of diseased individuals of both species.

Tumor Diseases--(See Figure 5) Two species of fish (Dover sole and white croaker) caught near ocean outfalls have been afflicted with epidermal papillomas--a type of benign tumor on the surface of the body. These tumors appear to be related only to these species.

Whether this disease is influenced by waste discharge



Fin erosion afflicts Dover sole and white croaker (shown above) living in the vicinity of ocean outfalls and areas of waste discharge. Incidence near the CSDOC outfall is approximately 3%.



LARGE EPIDERMAL PAPILLOMA ON A JUVENILE DOVER SOLE
Microstomus pacificus

These tumors are widespread and have not been correlated directly with wastewater outfalls but may be the result of ocean pollution by synthetic chemicals, or may be a natural phenomena.

practices is not known. The frequency of occurrence of tumors in fish in the Southern California Bight (coastal waters) is at the lower end of the range reported for the Pacific Coast.

Invertebrate Diseases. Lesions of an unknown cause have been found on specimens of crabs collected during trawls off Newport Beach during 1971-72. Although a bacterial origin has been suggested as the cause, contaminated sediments may also be a factor. Sea urchins in the Corona Del Mar area have been found to have extensive yeast-like fungal infections which resulted in death of some organisms. The cause of the infection has not been identified, but it may be related to marine pollution.

Mammal Diseases. There is evidence that wastewater discharges have increased the susceptibility of whales and dolphins to parasites which infect their ears and brains. There is evidence that PCB's or other chlorinated hydrocarbons may be implicated as a causative agent in the syndrome of premature birth found among sea lions living on California's offshore islands.

Bird Diseases. Marine birds such as the brown pelican nesting on California's offshore islands have suffered from the inability to lay hard-shelled eggs. Evidence supports the theory that DDT or PCB's may be the causative agents.

Kelp Bed Decline. In rocky areas off San Diego and Palos Verdes, wastewater effluents have increased the concentrations of nutrients and toxic materials which have directly affected kelp beds. Kelps beds along Orange County coast have diminished in size in the past. The actual cause of this decline is not known, but may be attributed to wastewater discharges, other human related activities, or perhaps natural changes in the marine environment which have not been identified. The kelp bed decline is one of the few adverse impacts attributed to the wastewater constituents measured by BOD.

PUBLIC HEALTH AND WATER QUALITY

Contamination by microbes

Pathogenic bacteria and viruses present in undisinfected treated wastewaters as now discharged by CSDOC to the marine environment may constitute a potential public health hazard. The pathways of infection in humans include recreational use

of contaminated waters and through eating shellfish that have concentrated the microorganisms. On occasion, beaches and shellfish beds along the California coast have been closed due to microbiological contamination from sewage discharges. No known cases of pathogenic infection have been reported by the State or County Health Department by people using these recreational waters where wastewater effluents are discharged.

Shellfish Sanitation

The CSDOC effluent discharge may affect a number of popular shellfish-collecting areas along the Orange County shoreline. (See figure 6.)

Recent surveys by the California Department of Fish and Game have shown that there are significant numbers of Pismo clams in the subtidal areas between Seal Beach and Newport Beach. Shellfish are filter-feeders and thus have the tendency to concentrate constituents from the waters in which they live. This makes shellfish particularly susceptible to contamination even in the presence of small concentrations of pollutants.

Onshore and Nearshore Bacterial Concentrations

The Districts have maintained a daily onshore or nearshore sampling program for over 15 years to determine compliance with bacterial standards. With completion of the new outfall (No. 2) in 1971, CSDOC came into regular compliance with new, more stringent onshore standards (30-day median MPN of 70 coliform organisms per 100 ml). Though there have been some violations, most have been attributed to other sources such as stormwater runoff or local contamination.

Periodic sampling of shellfish indicates that bacterial concentrations have been reduced as a result of the Districts' new outfall five miles off-shore. However, present bacterial counts in nearshore waters occasionally exceed the stringent standards established for shellfish-growing waters, and some shellfish show high bacterial levels, particularly in the Talbert Flood Control Channel which receives uncontrolled discharges of surface runoff and street drainage year-round. The flood control channel contains surface runoff and no sewage flows are carried in the flow. Consequently, it is questionable whether the CSDOC wastewater discharge is causing the bacteriological contamination of near-shore waters.

Viruses

Man's knowledge of the fate of viruses in the marine environ-



Protecting shellfish from contamination by bacteria, viruses, heavy metals, and chlorinated hydrocarbons is of vital importance since they are a valuable resource and are consumed by humans.

Figure 6

ment is limited, but it is known that their survival is enhanced by absorption to suspended particulates and that they can accumulate in sediments.

One public health concern of the EPA is the role which viruses may play in transmitting genetic information (such as resistance to drugs) to surrounding enterobacteria. Bacterial resistance has been found for at least 10 antibiotics and several other antimicrobials. The transmission of resistance from sewage (wastewater or sludge) to humans occurs via ingestion of contaminated water or poorly cooked fish and shellfish. Upon ingestion, resistance is transferred to the normal resident flora (fecal coliform) maintained in the host intestine.

The potential human health hazards associated with present waste discharge practices are not of a direct, quantifiable nature. There have been no epidemiological studies to determine the risk to consumers from eating shellfish caught along Orange County beaches or the risk of contracting a disease while swimming in local waters.

Heavy Metal Contamination of Seafood

Several metals that are concentrated by fish and invertebrates are known to have toxic effects in humans. The metals of particular concern are mercury and cadmium although lead may also affect humans.

Recent local studies have shown that rock scallops exposed to municipal wastewater discharges appear to be able to concentrate at least six potentially toxic trace metals (silver, cadmium, chromium, copper, nickel, lead, and zinc) in their gonadal and muscle tissues to levels at least twice normal concentrations. However, it is not known to what degree the elevated metals concentrations affect either the scallop or its predators including man.

Chlorinated Hydrocarbons in Seafoods

The potential for biomagnification of chlorinated hydrocarbons, particularly those from wastewater discharges, is of much concern. EPA has banned or limited the use of many chlorinated hydrocarbons known to have adverse effects on health and the environment. Some of these (such as DDT, aldrin, dieldrin, heptachlor, and chlordane) have been banned as potential carcinogens. The dramatic increases in chemically induced cancers during the last half century indicate that much more care needs to be exercised in the use of chemicals and control of potential environmental pollutants.

Seafoods, including commercial and sport fish caught in the coastal waters of Southern California, have been found to contain levels which exceed the U.S. Food and Drug Administration recommended guideline tolerance of 5.0 ppm wet weight of total DDT. Fishery products, including Pacific bonito, white croaker, and canned Jack Mackerel, have been condemned in the past.

Analyses are routinely performed to determine the chlorinated hydrocarbon content of fish in the vicinity of the CSDOC ocean outfall.

The data collected show that fish muscle tissues contain less than 0.6 ppm DDT and PCB. However, liver tissue of one California halibut contained 35.9 ppm of DDT residues, and samples average almost 15.0 ppm. PCB levels are also high in liver tissue. Although no adverse effects (fin erosion, etc.) were noted, such high concentrations may be affecting the fish directly or other animals in the food chain.

Analyses of fish caught by hook-and-line fishing show low concentrations with the exception of a white croaker caught in the October-December quarter of 1975 which contained 8.4 ppm of DDT.

WASTEWATER RECLAMATION

A preliminary analysis of the study area's future water demands, projected water supplies, and water quality indicates that by 1990 imported water from the State Water Project will need to be augmented by other new sources. During the next 10-15 years, it appears that wastewater reclamation will become a cost-effective alternative to developing new surface water supplies.

Reclamation and reuse of wastewater can supplement local water sources for a wide variety of uses (industrial processes, landscape and agricultural irrigation, groundwater recharge, and recreation) and provide greater independence and flexibility in local water management programs. The critical drought and water shortage the State now faces further illustrates the advantages of local reclamation facilities which can optimize the use of scarce water sources.

The facilities plan and EIS have assessed the potential need for and use of reclaimed water. Based upon a preliminary survey of water use, four reclamation projects have been formulated and compared in terms of cost, location, and their relative effect.

The high costs of reclamation (see alternatives discussion) could be reduced if a lesser degree of treatment were acceptable for certain selected uses. In light of the pending water shortages, the availability and costs of water may be such that reclamation may be increasingly cost-effective.

SYSTEM CAPACITY

Limited capacity in such utilities as sewage treatment can restrict urban development. If such services are adequate, continued growth may occur and produce a number of secondary impacts on environmental quality, particularly land use, air quality, water quality, and demands for energy. Growth also affects demands for community services such as police, fire, transportation, schools, and recreation facilities.

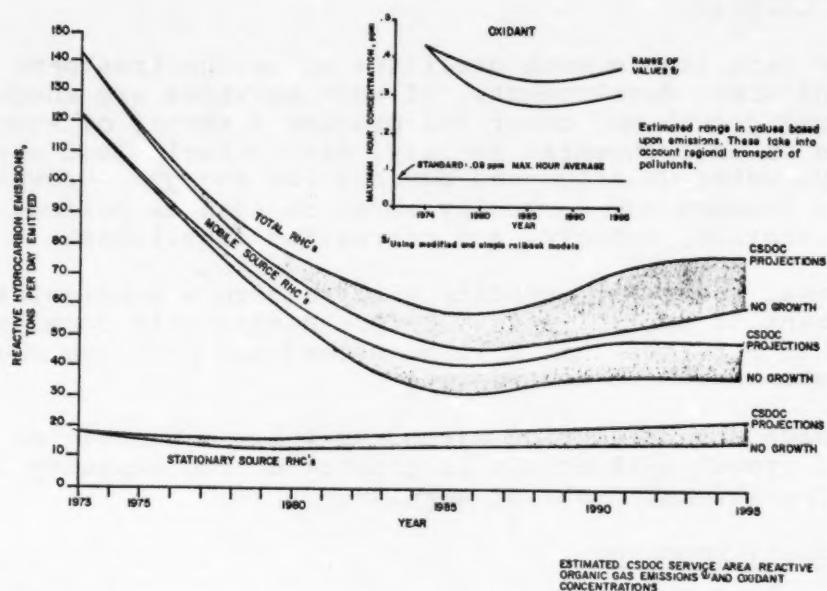
Additional treatment capacity will require a substantial investment of public funds. Before making this commitment, the other services that will be needed and problems caused by growth should be considered.

Any sewage flow reduction caused by water conservation or reduced growth will result in greater unused capacity and lower operational costs of service.

Air Quality Concerns

The continuing growth of Orange County facilitated by the additional wastewater treatment capacity also produces air pollution from a variety of activities including automobile travel, fuel combustion, and industrial production. Significant factors include:

- The major contributors to air pollution in Orange County are motor vehicles.
- Based on existing emissions trends and control policies, the study area's air is likely to remain polluted or get worse, and transport of polluted air masses from Orange County will continue to affect other areas downwind.
- Air pollutant concentrations (oxidants, particulate matter, carbon monoxide, and nitrogen dioxide) in the study area now exceed State and Federal standards established to protect public health.
- Health effects of air pollution include increasing fatality rates due to lung cancer and emphysema.



ASSUMPTIONS: The no growth emission projections are based on the assumption that there will be no population increase within the CSDOC service area and that Countywide emissions trends will continue to reflect reductions in motor vehicle emissions and minor increases in emissions from stationary sources, particularly fossil fuel and electrical generating facilities. CSDOC projections are based upon District estimates of population growth as listed in Table III-27 and shown on Figure III-12. The shaded areas represent the increases in emissions associated with growth in the CSDOC service area. It is these emissions increases which must be mitigated (see Chapter IX).

Figure 7

- Damage to orange groves continues to increase. The County Department of Agriculture also reports that spinach, which was a common crop, no longer can be grown due to high oxidant levels. Other affected crops include several lettuce varieties, barley, tomatoes, beets, chiles, and Swiss chard.
- Forests in Southern California have been exposed to damaging concentrations of photochemical oxidants for 25 years. This has resulted in extensive damage to the forests of the Angeles, San Bernardino, Cleveland, and Los Padres National Forests as well as the entire western slope foothills of the Sierra Nevadas.
- Most important, the air quality impacts without mitigation of population growth accommodated by these projects will significantly hinder the attainment of air quality standards (see Figure 7).

Because of such problems, the EPA must assure that providing for additional water pollution control facilities does not aggravate the air pollution problem which exists in the study area and areas downwind.

Land Use Changes

Depending upon the actual rate of growth, remaining agricultural land in the present service area, which totals approximately 3100 acres, could continue to be developed at the rate of about 150 acres per year. Although minor in magnitude, the impacts of this continuing change are much greater on a county-wide basis. Over the years these impacts have included a change in the economic base of the County toward industrial and commercial activities, noncontinuous growth patterns that may render remaining agricultural lands less economically operative, and a displacement of agriculture to areas further away from consuming centers and perhaps to lands of less productivity.

Demands for Services

Continued urban development will place greater demand on existing transportation systems and create a need for additional schools, police and fire protection, and other government services. The shape and form of urban development (poorly planned sprawl versus planned higher density development) can greatly affect the costs of providing such services as well as the relative impact on the environment. More local employment, better public transportation, and other more

efficient uses of existing facilities with planned higher density developments can reduce such demands for services.

Resource Utilization

Other growth-related impacts include the increases in energy and water consumption, generation of solid waste, increases in wastewater flow, and the use of land and construction materials. The magnitude of some of these growth-related effects are summarized in Table 9.

OTHER ISSUES AND PROBLEMS

Sludge

Full secondary treatment will increase the volume of sludge needing disposal by approximately one third over the "no-project alternative." Greater capacity for growth will further increase the sludge volume. The sludge is presently processed as a soil amendment which makes use of its beneficial properties, but unfortunately this disposal method is potentially hazardous because of the high concentrations of PCB's, heavy metals, and other toxins in the sludge. Proposed Health Department Regulations would prevent the further use of the sludge as a soil amendment at least until the industrial toxins were removed by pretreatment (see Table 12). Another disposal option would be landfills. However, this disposal method is often expensive.

The industrial pretreatment requirements are resulting in greatly increased volumes of often very toxic industrial sludges needing disposal. The lack of Class I disposal sites severely limits the disposal options, however.

The calciner component of the Activated Carbon Treatment System (one of the treatment alternatives) could potentially be used to reduce the sludges, both domestic and industrial, to a nearly inert form that would greatly facilitate disposal. However, this process is still in the testing stage.

The Regional Sludge Study (LA/OMA) has so far not uncovered any easy solutions. Consequently, sludge disposal is an immediate and significant problem.

Effluent Disinfection (Chlorination)

Present onshore bacteriological data does not indicate a need for effluent disinfection except on infrequent occasions when spills occur and as a result of power failure or when

TABLE 12
RANGE OF CONCENTRATIONS OF CONSTITUENTS WHICH OCCUR AS ENVIRONMENTAL CONTAMINANTS
(ppm, dry weight)

Element	Observed Range in Concentration			Criteria			Effects of Excessive Concentrations
	In Soils ¹	In Plants ¹	In CSDQC Sludge ²	EPA ³	USDA ⁴	California Department of Health ⁵	
Cadmium	0.1-7 ⁶	0.2-0.8 ⁶	50	10	<0.5% of Zinc	<25 ppm-100 ⁵ <1.5% of Zinc	Must be kept below phytotoxic levels; can accumulate in liver, kidneys, pancreas, and thyroid of animals, including humans.
Zinc	10-300 ⁶	15-200 ⁶	1,050	2,000	<2,000	--	Necessary in trace quantities; reduces root yield; nontoxic to humans in normal concentrations.
Copper	2-100 ⁶	4-15 ⁶	325	1,000	<800	--	Phytotoxic at levels below those dangerous to food chain except in case of grazing animals; reduces root yield; essential in metabolism of iron.
Nickel	10-1,000 ⁶	1 ⁶	325	200	<100	--	Phytotoxic, particularly to citrus; reduces root yield; very low toxicity to man.
Mercury ⁷					<10	--	Highly toxic; accumulates in body tissues; not terrestrial food chain threat.
Lead	2-200 ⁶	0.1-10 ⁶	725	700	<1,000	--	Highly toxic to plants; accumulates in bone; not readily translocated to food portion of plants; danger from sludge sprayed on foliage.
Boron	2-100 ⁶	30-75 ⁶	75	--	<100	--	Toxic to plants, but not toxic to humans or a threat to food chains.
Chromium (Total)	?	?	500	--	--	--	Not phytotoxic nor a threat to humans or terrestrial food chains since it occurs as Cr ⁺³ ; however, it can be toxic to aquatic life in runoff in the Cr ⁺⁶ form.
Polychlorinated Biphenyls	<.01-3.3 ⁷	--	38-40 ⁷	--	--	10	Toxic to all forms of aquatic life; undergoes bioaccumulation and represents a threat to both aquatic and terrestrial food chains.

¹Brady, W. C., 1974, The Nature and Properties of Soils.

²See Table VII-9.

³Interim guidelines for maximum content in sludges to be applied to land which will ever grow crops in the human food chain (May, 1974).

⁴Chaney, 1973, Recycling Municipal Sludges and Effluents on Land, proceedings of Illinois conference sponsored by EPA in 1973.

⁵Proposed State minimum standard: (Draft, September, 1976).

⁶Naturally occurring values.

⁷Nisbet, I. C. T., 1976, Criteria Document for PCB's, prepared for EPA by Massachusetts Audubon Society.

adverse ocean conditions occur which result in higher onshore bacteriological counts. However, it is recommended that a cooperative shellfish study be conducted during the winter months when the effluent field is known to surface and stormwater runoff impacts onshore areas. This cooperative study could be conducted by the Districts, Department of Fish and Game, and State and local health departments.

The results of this study could be used as a basis for determining if continuous chlorination is needed.

Project Phasing

The Facilities Plan presently schedules additional primary capacity to be constructed and on-line before the corresponding secondary treatment begins construction. This phasing does not meet EPA and SWRCB funding requirements that additional primary capacity be accompanied by secondary treatment for that capacity. Consequently, the schedule will have to change before funding is provided.

Figure 8



Lack of treatment capacity could limit the amount of new housing which can be built. Ongoing urban growth and development will place additional demands on natural resources, services, and have a variety of secondary impacts on the environment, especially air quality.

MITIGATION MEASURES

Many of the impacts summarized in this report can be reduced, minimized, or eliminated by a variety of activities. EPA and the State Water Resources Control Board are constrained by the requirements of the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA), respectively, from funding these projects unless the adverse impacts of the projects are mitigated.

Recommended and Accepted Primary Mitigation Measures

The Districts will implement various measures to mitigate the primary impacts associated with construction and operation of the proposed facilities.

These measures include actions to reduce noise, dust, odor, energy consumption and flood and seismic hazards. The aesthetic appearance of treatment facilities will be maintained or improved. Most notable are the following:

- The Districts will participate in the development of a comprehensive water conservation program.
- Efforts will be made to reduce wastewater solids loadings by pretreatment and/or educational programs.
- Covers will be installed on facilities which emit aerosols which could have adverse effects on the health of workers or nearby residents.
- Archeological and soils studies will be conducted prior to design of any of the proposed facilities.

Other Recommended Primary Mitigation Measures and Studies

- Conduct a comprehensive energy use and conservation study and examine the feasibility of alternate energy sources.
- Additional source control measures may be needed to reduce effluent concentrations of chlorinated hydrocarbons, metals (cadmium, in particular), grease and oils, and other toxic constituents (cyanides, arsenic, phenols, ammonia).
- Investigate the potential hazards from use of the sludge as a soil amendment.

- Continue monitoring and analysis of effects of waste water discharges on the marine environment. More studies of metals, in particular, in Benthic organisms and metals being bioaccumulated is necessary.

Implementation

The Districts have the necessary authority to assure that planning, design, construction, and operations take into account these measures. Implementation can be accomplished through design and contract specifications, operating procedures, and administrative orders. Recommended studies can be funded through Clean Water Grants funds in many instances.

During review of the Draft EIS and process selection, additional measures may be proposed. These measures will be assessed, and those which EPA believes are appropriate will be listed in the Final EIS. Public and agency response including suggestions for other mitigation measures is urgently requested.

Secondary Impact Mitigation Measures

Secondary (indirect) impacts associated with urban development accommodated by the proposed project through increases in wastewater capacity and provision of additional trunk sewer capacity will be substantial. Impacts of greatest concern to EPA and SWRCB are the effects of growth on regional air quality, water supplies, and land use.

Unless environmental effects which contravene Federal statutes (particularly air quality standards) are minimized through mitigation measures, Federal grants for the design and construction phases may be withheld. Reasonable conditions may be imposed on grants to insure that mitigation measures are instituted. It is generally required that grant recipients demonstrate that they are making or will make a good faith effort to mitigate adverse impacts before a grant is awarded by EPA.

CSDOC also has the responsibility for mitigating the secondary growth-related impacts of the project or at least obtaining commitments from other responsible agencies who have the authority and resources to aid in this effort. Although CSDOC does not have direct authority in the areas of land use, air pollution control, and other areas where mitigation of secondary impacts is needed, the CSDOC is working with local governments that do

have the necessary authority. These commitments from local governments and agencies will be in the form of resolutions of support for various measures. The exact nature and extent of these commitments will be developed using measures proposed in this Draft EIS as well as those suggested by local agencies. A coordinated program will then be developed and presented in a Final EIS.

EPA, Region IX has indicated formally that to award a grant, EPA must be able to determine that the award action does not cause or contribute to a violation of air quality standards. The Districts and local governments must take actions such that there is no air quality degradation as a result of the project.

After a grant is made, EPA will continue to follow the Districts' progress in instituting mitigative actions. If the Districts fail to abide by grant agreements, EPA will take appropriate actions.

The EIS lists a variety of potential mitigation measures to reduce secondary impacts. None of these measures is specifically required by EPA; rather, EPA believes that local agencies should determine which measures are appropriate for their particular area. Development of detailed mitigation measures during the remaining planning and analysis efforts is the responsibility of the Districts and appropriate government agencies with the authority to implement the proposed measures.

The State of California (Air Resources Board and State Water Resources Control Board) also requires mitigation of secondary impacts on air quality resulting from projects funded by Clean Water grants. If air quality analyses indicate that emissions related to grant funded projects either contribute to the continued violation of, or prevent the maintenance of, ambient air quality standards in the project area, one of the following alternatives must be undertaken:

Alternative I

1. Resolutions acknowledging adverse air quality impacts and agreeing to participate in the development of an Air Quality Maintenance Plan (AQMP) must be provided by the grantee and the local general purpose governmental legislative body.
2. A grant condition must be agreed to that limits flows to the ten year E-0 population projection related flow for a period of 10 years after the

date of concept approval, unless, prior to that time,

- a. impacts of excess flows are mitigated, or
- b. an AQMP is approved by the State.

If the project is designed and built for the projected 10-year E-O population related flow or less, the above grant condition would not be required.

It is anticipated that in a few circumstances this alternative may not be stringent enough to assure minimal impacts on air quality. In these cases, stricter limitations may be necessary.

Alternative II

The applicant must make commitments to implement mitigation measures developed to minimize adverse secondary air quality impacts of the project. Where possible, the implementation of these measures shall be in cooperation with the local AQMP effort.

The Facilities Plans and EIS/EIR development process have identified the following types of secondary impact mitigation measures that should be considered:

- 1. Air quality mitigation measures
 - a. Emission control measures
 - (1) Surface coatings and organic solvent usage
 - (2) Vapor recovery and reduction in volatility
 - (3) Motor vehicle inspection and maintenance program
 - (4) Extended warranty on new cars
 - (5) Additional emission controls on motor vehicles
 - (6) Home utility engine replacement
- 2. Transportation-related measures
 - a. Regional transit improvements
 - b. Local transit system improvements
 - c. Regional and local bike path development
 - d. Other transportation/air quality measures
 - e. Pedestrian paths
 - f. Localized business and industry
 - g. Parking management

3. Land use policies
 - a. General plan land use policies
 - b. Preservation of agricultural lands
 - c. Conservation of open space
 - d. Prevention of further shoreline development
 - e. Prevention of development near watercourses and floodplains
 - f. Protection of scenic areas
 - g. Protection of scientific and education resources
 - h. Protection of wildlife and vegetation
4. Growth management activities
 - a. No growth policies (This generally represents a failure of the mitigation process.)
 - b. Growth management including slowed growth or timed development
 - (1) Overall County policy changes
 - (2) Redevelopment in older communities
 - (3) Controlling and channeling growth
 - c. Methods of managing growth and land use
 - (1) Zoning
 - (a) Traditional zoning
 - (b) Innovative zoning
 - (2) Subdivision regulation
 - (3) Open space acquisition
 - (4) Land banking
 - (5) Annexation
 - (6) Preferential assessment
 - (7) Review of development proposals (assessing environmental impacts)
 - (8) Cost-benefit studies of alternative land use plans
5. Water quality protection
 - a. Urban stormwater runoff controls
 - b. Erosion controls
 - c. Grading regulations
 - d. Energy conservation measures

Many other measures may be appropriate, and the Districts and local agencies should develop and implement measures which are tailored to the local area.

The Environmental Protection Agency has requested that each city within the CSDOC service area and Orange County describe its program to implement secondary impact mitigation measures outlined in this Draft EIS or other appropriate measures which are currently underway or can be agreed on or implemented

within one year. In addition, it is recommended that a program to evaluate the feasibility or effectiveness of additional mitigation measures be undertaken by each appropriate jurisdiction.

EPA has also requested action in the form of resolutions of the County and cities that:

- Acknowledge the problem of air quality as related to growth and sewer capacity.
- Commit each jurisdiction to cooperate in the regional planning and implementation of an air quality management plan to be adopted by the South Coast Air Quality Management District by January 31, 1979.
- Commit each jurisdiction to assist in the development of a more comprehensive regional approach to solving certain environmental problems such as increases in water use, energy consumption solid waste generation, and parking and traffic congestion.

EPA cannot act to approve the CSDOC project for a grant unless it can be assured that the project planning is consistent with other environmental goals including those of the Clean Air Act. In addition, the State Water Resources Control Board has reached an agreement with Air Resources Board that mitigation measures or a flow limitation will be implemented as a condition of receiving a State grant and approval.

The nature of the mitigation measures to be considered by EPA and the SWRCB as a condition of a grant for waste treatment facilities will depend on the applicable laws and agency and public response. All oral and written comments submitted during the review process will be considered by EPA and will provide the basis for the Districts', State Water Resources Control Board's, and Environmental Protection Agency's final decision on the project.

CONCLUSION

The County Sanitation Districts of Orange County and EPA have provided this study to serve as a basis for public participation in decisions on constructing important wastewater treatment facilities. Providing wastewater service to a large and growing urban area is a complex, difficult, and expensive undertaking. No analysis, however lengthy, can be complete and cover every factor that could be affected by these facilities. Therefore, individual suggestions, comments, criticisms, and recommendations are welcomed and will be seriously considered when future agency decisions are made.